# MACHINE TOOL BLUEBOOK

JANUARY 1943





In the

Aviation Industry

Performance

has established

Leadership

for

HARDINGE

High Speed

Precision Machines





"cuts can be made that are not obtainable on any other saw!"



At Vultee Aircraft Inc., this MARVEL No. 8 "has a very wide use" and "has proved a very efficient machine," for it is in continuous use sawing Pipe — all diameters; Bar stock-both machine stock and tool steel; Structural steel-angles and shapes and Steel Plate. What other saw could make the angle cut illustrated in the close-up but the universal MARVEL No. 8 Metal-cutting Band Saw on which the blade feeds into the work at any angle from 450 right to 450 left!

#### ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U. S. A. Eastern Sales Office: 225 Lafayette St., New York



Replaceable Spindle Belts



Long Taper Key-Drive Ness



Convenient Drive Control

#### SPECIFICATIONS

Swing over had, die. 97
Entriere bereiere 125
Collet copacity, max, die. 5
Step chusic copacity, max, die. 5
Sper chusic copacity, max, die. 5
Sper chusic copacity, max, die. 5
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Elde such trevel of ties per alide. 5
Elde such trevel of cross side 5
Tuilsock spinnfele travel . 3
Spinnfel speedit . 3



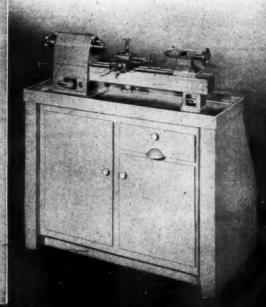
For Further Description Write for Bulletin 715

#### RIVELL

#### 715 PLAIN BENCH LATHE

Power and Speed Range Are Combined with Precision for Greater Earning Capacity

The Rivett No. 715 Bench Lathe fulfills two disting functions: the production of small duplicate parts requiring extreme accuracy, and the finishing and fitting of fine element, in assembly, maintenance, tool room and labeled your continues and extend its usofulness and each empty the interest truth of the prelocete sail bearing sindle. The attachments include the milling attachment. The unit motor drive provides eight selective spindle speeds and may be used with either steel cabinet or bench mounting.



RIVETT

BRIGHTON, BOSTON, MASS.

H LATHE DEVELOPMENT

Horizontal-Vertical Fixture with Sub-Bas and Tailstock for PRODUCTION WORK.

# HARDINGE JixturesCollet Index Pixture units you we When you use HARDINGE Collet Index Fixture units you we The production from we will be a fixture units you we The production of the prod

When'you use HARDINGE Collet Index Fixture units you will get more production from your old or new Milling Machines, Grinders, Shapers and Drill Presses. The 1" collet capacity, 20 or 24 hole index plate and 4" center. Drill resses. The Tonic capacity, our all not make past and "center, height has a definite application to your second operation and inspection work. The index plate of the Horizontal-Vertical Collet Index Fixture has an arrangement whereby all holes may be "blinded out" except those required for a par Either fixture can be used individually, with the Tailstock, or with the Base as illustrated

HARDINGE BROTHERS, Inc. · · ELMIRA, N. Y.



## RMSTRONG



#### This war is being won with High Speed Steel in Armstrong Tool Holders

Victory begins in the tool rooms and machine shops, for striking power lirst takes form in jigs, fixtures and dies. . . in more and more machine tools, each operating continuously at the highest possible speeds and feeds.

Since the capacity of any machine tool is limited to the efficiency and capacity of its cutting point, we can afford, today, only the strongest and most efficient cutting tools with the finest cutting edge. This means, for all general lathes, planers, alotters and shapers, and for many screw machine and turret lathes, the correct ARMSTRONG TOOL HOLDER with a cutter bit of high speed steel.

With high speed steel so essential to top efficiency, so widely needed and with our national supply so difficult to maintain, to waste high speed steel in forged tools is to delay victory because the same high speed steel consumed in one forged tool would supply high speed steel cutters for 10 ARMSTRONG TOOL HOLDERS—would go 10 times as far, would do 10 operations instead of one, would machine 10 times as many dies or jigs. Use ARMSTRONG TOOL HOLDERS wherever possible to "Save: All Forging, 70% Grinding and 90% High Speed Steel." This war is being won right now in jigs and fixtures—with High Speed Steel. over 96% of the machine shops and tool rooms.



Armstrong Bros. Tool Co. "The Tool Holder People"
308 N. Francisco Ave.,
Chicago, U. S. A.
Eastern Warehouse and Sales:

199 Lafayette St., New York



### Medito Tool Eluc Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

35,000 This Issue

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Phone: HARrison 6040

Cable Address: HITCHPUB

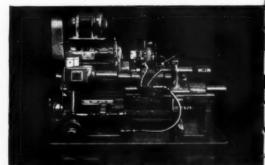


### Every modern soldier



Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fav Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators ... Automatic Opening Threading

Dies and Chasers



Jones & Lamson 12' Fay Automatic Lathe tooled to face, groove and cam turn automobile pistons.









### owes a debt to ALBERT BALL

ALBERT BALL'S solution of Colonel Benton's problem was neither the first nor the last of hundreds of such problems overcome by Jones & Lamson engineers and by their predecessors.

Ever since 1833, in the early shops at Windsor, and since 1888 in factories still expanding at Springfield, generation after generation of machine builders has been working in continuous succession. Through more than a century they built up an accumulation of knowledge that forms a background for the rapid, far-reaching developments that characterize the work of Jones & Lamson engineers.

Thus today, Jones & Lamson engineers

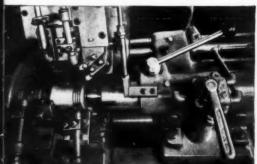
are called upon in turn to design and equip whole new factories for mass production or to take the kinks out of a single job like the one pictured here.

Time is saved by cam turning while facing and grooving pistons on the Fay Automatic Lathe — grinding time is reduced to a mini-

Whether your plant is large or small, your production problem big or little, it pays to write for help to Jones & Lamson engineers. With Jones & Lamson equipment you can meet today's wartime demands and still be ready for the hard years ahead. Illustrated catalogs are available.

#### LAMSON MACHINE COMPANY

SPRINGFIELD, VT., U. S. A.



Close view of tooling on a Jones & Lamson 12' Fay Automatic Lathe tooled to face, groove and cam turn automobile pistons.









MACHINE TOOLS

AUTOMATIC OFF



PATENT NOTICE

The machines illustrated and described on these pages are manufactured under and protected by issued and pending United States and Foreign Patents.

# FOR RAPID PRODUCTION

PRODUCTION of parts for war material and essential civilian items can be often speeded up by replacing old shop equipment with new machines, with automatic machines, by employing more intensive tooling, new production methods. Perhaps in your own shop you can find many such opportunities for increasing production per unit of man power and factory space. In the fields of milling, grinding, broaching, lapping, die sinking, and cutter sharpening, look to CINCINNATI for more efficient machine tools and more dependable Engineering Service.

ASCUE: No. 5.56 Duples Hydro-Broach Machine. A continuous producer: broaches part in one station while other station to the production in production in production in production in production in production in the production in th



mall parts.

ABOVE No. 0.8 Vertical Mill-Important in the ing Machine. Important in the production of small parts when vertical milling is desirable.



ASOVE: 12" Hydraulic Universal Grinding Machine. Raises teel confunction of the second of accuracy and production and job shop grinding to a new level of accuracy and production and job shop grinding to a new level of accuracy and production and job shop grinding to a new level of accuracy and production and job shop grinding to a new level of the production of the prod



ABOVE: No. 1-18 Plain Automatic Milling Machies For shops where high production of set parts is an important factor.

TOOL ROOM AND MANUFACTURING MILLING MACHINES ... SURFACE BROACHING MACHINES ... CUTTER SHARPENING

# of War Materiel

WITH AN EYE

LEFT: No. 2. Conterless
Grinding Machine
Stathes grinding cost
Stathes grinding cost
on a host of parts: stee
on a host of parts:
rubber.
stc. Economical
rather small lots, hoo

ASOVE: Dial Type Milling Mechine. Accurate and productive millers for interest of the tool room and production shop. Plain mechine illustrated Also built in universal and vertical styles. Not. 2, 3 and 4 size.

Plain Nydromatic Milling Machine. For the heavy jobs of the production of large quantity production of the plain and duplas styles. Whade in plain and duplas styles. Made in plain and duplas styles.

No. 2.74 Plain Automatic Milling Machine with Hydraulic Rise and Fall Mechanism for the Spindle Cerrier.

In the Same



FLEXIBILITY of equipment is highly important to war industries. The job today may require a traverse grinder—tomorrow's job may need a plunge cut machine. Norton 6" and 10" Type C Cylindrical Grinders can do both jobs.

Plunge cut operations, furthermore, can be manually or automatically controlled, and for traverse operations an automatic feed at each table reversal with a new infinitely fine feed mechanism is provided.

One of the attractive things about this flexibility is that the changeover from a traverse to a plunge cut job involves no loss of time above that normally required to make any new set-up. Flexibility is surely a consideration of major importance today.

NORTON COMPANY Worcester, Mass.

M-441



# A NEW YEAR!



### SYMMETRIC MACHINE TOOLS

#### HYDRAULIC HACK SAW



- I Infinite, self-compensating, constant pressure feeds.
- 2 Hydraulic lift on return stroke.
- 3 Hydraulic lift on saw frame on completion of cut.
- 4 Three speed gear box.
- 5 Coolant pump sychronized with cutting stroke.
- 6 No manual labor to raise or lower saw frame.
- 7 Blade cannot fall on work.
- 8 Graduated vise with 45° swivel.
- 9 No clutch or counter shaft.
- 10 All working parts enclosed and running in oil.

The undisputed advantage of HYDRAULIC power applied to a hacksaw which has been perfected thru years of shop experience.

### SYMMETRIC ENGINEERING

147 WEST ALAMEDA AVENUE . BURBANK, CALIFORNIA

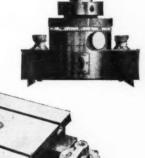
# A NEW HIGH!



# SYMMETRIC MACHINE TOOLS

#### **FLYCUTTER**

with micrometer adjustments. The Traverse Table and the Fly Cutter will convert your drill press to a vertical milling machine.



HYDRAULIC TRAVERSE TABLE

This new machine tool is made for use on mills, drill presses, planers, shapers, grinders, etc. It is hydraulically operated with controllable speeds in both directions for fast precision work. Well designed and made of the finest materials, it is a machine tool of unequalled value to any shop.

### SYMMETRIC ENGINEERING

147 WEST ALAMEDA AVENUE . BURBANK, CALIFORNIA



TAPPING ATTACHMENTS
GROUND ROTARY FILES
FLEXIBLE SHAFT MACHINES

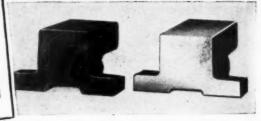
THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.



THE CHARLES L. JARVIS COMPANY, MIDDLETOWN, CONN.

When It Must Be

- 1. DEAD FLAT
- 2. EXACTLY SQUARED
- 3. GLASS SMOOTH



# THIS PORTER-CABLE WET-DRY SURFACER

Will Do It to Finer Limits

. . . FASTER





What would it cost you to do this job on your milling machine?...an actual production job turned out in jig time on a PORTER-CABLE WET-DRY SURFACER. The specifications say it must square true to 900, with both surfaces finished dead flat and glass smooth. Yet operators of average skill have no trouble in meeting the specifications. The speed they maintain makes it a big saving to do the operation on the WET-DRY SURFACER.

PORTER-CABLE WET-DRY SURFACERS are relieving the pressure on millers, shapers and planers in scores of plants. Much of the work is done free hand, though for close limits up to .0005\*, simple fixtures are used.

Various models of the WET-DRY SURFACER are readily adaptable to many secondary operations such as burring, finning, finishing, cutting radii and the like. Production men find them especially valuable where work must be fitted to the capabilities of women and unskilled workers, because their simplicity of operation insures speed, accuracy and safety.

Learn about this new machining method that's a revelation in many shops....the new, low-cost way to increase production and relieve overburdened major machine tools. Write **today** for copy of Free booklet: "Wet-Dry BellSurfacing," "without obligation.

#### PORTER-CABLE MACHINE CO.

300-1 Exchange St. Syracuse, N. Y.





### VAN NORMAN CONTROLS ARE EASY TO REACH AND USE . . . Save Time and Lessen Fatigue

An operator working at the front or back of a Van Norman Milling Machine can readily reach a full set of power controls without going around to

the other side of the machine. These controls are conveniently grouped and easy to use. They are directional in motion and remove any chance of confusion, because the levers are moved in the same direction in which the operator wishes to move the table, knee and saddle,—left or right, up or down. Illustrated bulletin sent on request. Write on your business letterhead.



In June, 1942, Van Norman was awarded the Army and Navy E in recognition of its war production record

VAN NORMAN MACHINE TOOL COMPANY SPRINGFIELD, MASS., U. S. A.

# Gets into tight spots!

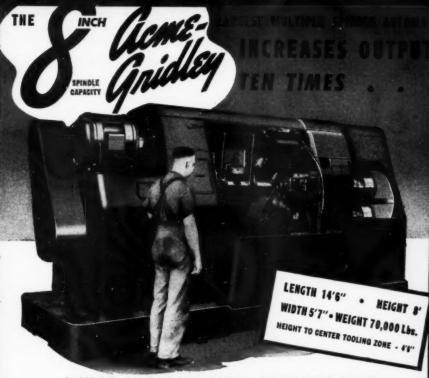
LOOK at that O.D., and you'll know why Apex stud setters get into hard-to-reach places with such ease and precision—even in the hands of semi-skilled workers. These simple, trim, clean-cut stud setters have small body diameters for their capacities. They are extremely easy to adjust for length of thread on stud and maintain proper adjustment in service. Simple design plus ample ruggedness and toughness make them fine tools for either hand or power applications. Four different sizes will set studs up to 11/4". You can get them with Morse taper, hexagon, T-handle and male or female square drive shanks, or combination T-handle with female square for use with a torque wrench. Write for Bulletin No. 101 for all the facts.



THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Allanufacturers of friction tapping chucks, quick change and positive drive drill chucks, vertical float tapping chucks, peculial floating tool holders, power bits for Phillips, statted hand and Clutch Mond screws, hand tools for Phillips and Clutch Mond screws, quicualt universal joints, plain and universal joint socket werenches.





#### A WAR ASSIGNMENT - AGAINST TIME

With total war came the jump — demand from hundreds to thousands of airplane motors and tanks per month. These require precision parts of large diameter and on schedules that single spindle methods could not possibly meet.

Our Government said "Build 8 inch Acme-Gridley 4 Spindle Automatics for these parts manufacturers; apply your experience, skill, plant facilities — and lose no time."

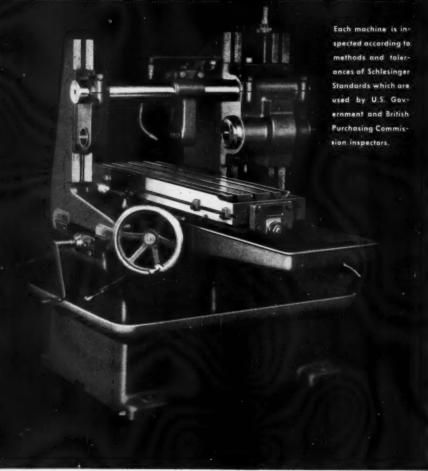
In less than 5 months we designed, built, tooled and delivered the first machine to customer's plant. Immediately and without makeshift it was pronounced "running to perfection" and PRODUCING THE JOB 10 TIMES FASTER THAN HAD BEEN POSSIBLE BY THE FASTEST SINGLE SPINDLE METHOD PREVIOUSLY USED.

The record time from design to delivery included our building jigs, fixtures for complete interchangeability of tooling and parts. And continued deliveries of many more of these 35 ton giant multiples have not interrupted our production of the hundreds of six spindle Acmedridley munition automatics in other sixes en war schedules.

We are proud to have again fulfilled this, our special war assignment, on time and in time.

WATIONAL ACME 60.

#### No. 33 SIMPLEX PRODUCTION



The following standard equipment is furnished with each machine: Set of six gears each for leed and speed changes, two Arbor Supports,

Harness, Arbor Tightening Rod, Pump for cutter and work cooling, two large Drip Pans, and Crank Handles and Wrenches.

**Precision Boring Machines** 

STOKERUNIT

#### MILLING MACHINE

Use It for Slab or Face Milling . . . Tool It Up to Relieve Your Present Millers, Planers, Shapers



Put this rugged production miller to work in your plant now! Tool it up to relieve your present millers, planers or shapers. Furnished in three popular sizes, the No. 33 will handle a wide range of slab or face milling operations with precision and speed ...at a time when every machine in your plant must work at peak capacity!

Hundreds of No. 33's are doing their full share of vital milling jobs in war plants throughout the United States, and in Canada, England and Australia.

PROMPT DELIVERIES—The 36" machine, priced at \$3,520, is available in thirty days. Either the 50" machine, at \$4,155, or the 60" machine at \$4,815, can be shipped in six to eight weeks. Prices include motor and control for 220 or 440 V., 3 phase, 60 cycle. All deliveries subject to prior sale and priority regulations. ... Write today!

#### PRICES . . . DELIVERIES . . . SPECIFICATIONS

Prices Subject to Change without Notice	36" MACHINE	MACHINE	60" MACHINE \$4,815	
PRICES, Net 30 days, F.O.B. our Plant	\$3,520	\$4,155		
DELIVERIES—Subject to prior sale and priorities	30 days	40-60 days	40-60 days	
TABLE—Power Feed (Rapid Traverse—100" per minute)	40" x 13"	50" 57%" x 13"	60" 67½" x 13"	
RANGE—Cross, with Harness (Hand Feed). Cross Traverse, without Harness (Hand Feed). Top of Table to Arbor, minimum. Top of Table to Arbor, maximum.	121/3"	9" 12½" 0" 11½"	9" 12½" 0" 11½"	
WIDTH—Head Frame to Harness Brace End of Spindle to Harness Brace	251/4"	251/4" 24"	25½" 24"	
SPINDLE—Taper Hole—American Standard Diameter of Hole through Spindle Number of Spindle Speeds Spindle Speed Range, r.p.m.	6	1½" 6 25-152	1¾" 6 25-152	
FEEDS Number of Faeds. Feed Range, inches per minute		1½" to 30"	19 136" to 30"	
ARBOR Recommended (Not Included with Machine)	1½ B30-5	1½ B30-5	1½ B30-5	
Diameter Length, shoulder to nut	1½" 30"	1½" 30"	13/2" 30"	
NET WEIGHTS (in lbs.)		5,250	5,455	
OVER-ALL HEIGHT		71"	71"	

IN THE SHOP TOO

Thompson.

MILLING FIXTURE



In the shop, too, the Thompson Universal Milling Fixture, with the 3-way circular swing, will help to produce the best, efficiently, economically. Designed specially for use on any standard bench lathe — converts any bench lathe into an efficient, time-saving milling machine — vise and universal slide base can be used without index fixture for

straight or angular milling. Provides a wide variety of applications — for milling punches, key ways, "C" bores, or the manufacture of duplicate parts. Practical, efficient, time-saving, the "Thompson" is a "must" in the modern machine shop or tool room. Produce the best — specify Thompson Universal Milling Fixture. • Write for further information.

AUTO-ORDNANCE orporation

THOMPSON TOOL DIVISION
342 WEST PUTNAM AVENUE, GREENWICH, CONN.



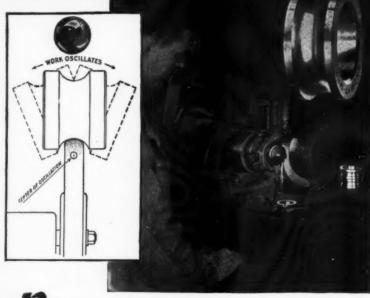
## Thempsen · SPRING COLLET ADAPTER

The Thompson Spring Collet Adapter helps to produce the best — efficiently, accurately. Our men and women in the shops must have the best in order to produce the best for our fighting men — that's important. • Consisting of only two parts, the "Thompson" is sure gripping — eliminates have, bulky chucks — brings work in closer proximity to work. • Specify "Thompson" and produce the best.

### AUTO-ORDNANC Corporation

THUMPSON TOOL DIVISION

342 WEST PUTNAM AVENUE, GREENWICH, CONN.



## Perfection IN THE GROOVE

RACEWAY GRINDING in GJB Bearings is done with the most modern oscillating grinders.

Steel Balls accurate in sphericity to .000025 can perform best only when the raceway in which they travel matches them in accuracy... note diagram.

The arc in (CJB) Ball Bearing raceways is made micromatically accurate to match the steel balls by automatic oscillating grinders.

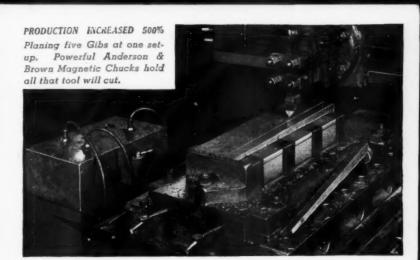


By this method the raceway oscillates transversely across the face of the grinding wheel, as illustrated above, consequently there can be no errors in contour. That's why (CJB) Ball Bearings last longer.

GJB BEARING COMPANY

Manufercharies et CJB Mester Bull Emzengs

AHLBERG \* 3009 WEST 47th STREET . CHICAGO, ILL.



# NOW—Super-Power Magnetic Chucks for Your Shapers and Planers!

Intense Holding Power and Flexibility
of Anderson & Brown Magnetic
Chucks Cut Your Production Costs

● The photo shows only one of the many time-saving applications of this remarkable new-type chuck. Utilizing the principle of "Magnetic Body Flo," this method of holding work goes far beyond the limitations of conventional magnetic chucks, providing power and adaptability not heretofore possible.

On all types of surface grinders, as well as planers and shapers... in the tool room and on the production line... hundreds of shops are now enjoying the amazing advantages of ANDERSON & BROWN Magnetic Chucks.

ILLUSTRATED CIRCULAR - FREE

Learn more about how this magnetic chuck can save you time and money! Write for your copy of "Magnetic Chucking Revolutionized".



ELIMINATES COSTLY FIXTURES

The above jigs and several operations were eliminated from the job illustrated at top of page. Why not save the cost of fixtures and speed up your production with ANDERSON & BROWN Magnetic Chucks?

ANDERSON & BROWN CO.

2036 East 22nd Street Cleveland Ohio

ELECTRIC REID SURFACE GRINDER

Precision Grina



The Improved Reid Automatic Feed Surface Grinder embodies the latest trends in machine tool manufacture with experience gathered over a period of thirty years. Centralized control, improved castings, complete dust protection and master craftsmanship are combined in this efficient and extremely accurate machine.

Capacity: Grinds work 18' long, 6' wide, and 11' high, using a wheel 7' in diameter. Emergency height of 14' can be obtained by removing front, back and top dust plates. Grinding head designed with standard 3' hole to accommodate motorized spindle. Work table 18'x6'. Automatic or manual table feeds.

Exclusive Selling Agents

H. LEACH

SPEED-ACCURACY WITH "LEACH" EXTERN

# ing Machines

GRINDER

Massive base and pedestal. Extra bearing area. 452 Sq. In of hand scraped bearing surfaces. Power feed—Six table Speeds Micrometer adjusted tailstock with spring action. Work spindle mounted on three precision ball bearings. Hardened and ground tail stock and dead center spindles.

#### SPECIFICATIONS

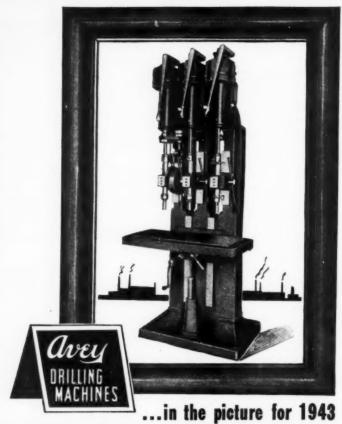
Table teeds—¾, 1½, 1½, 1½, 2½, 3½, per minute. Work spindle speeds 73, 104, 144, 213, 294 rev. per minute. Wheel spindle speeds 2750 RPM. Spring action tail stock. Capacity ½, to 7 diameter, ¼ to 11' length. Wheel 10'x¾'x2'. Tank capacity 3½ gallons. Spindle motor ¼ HP AC, 60 Cycle, 110, 220 volts. Wheel head motor 1 HP, AC, 60 cycle 110,220 volt. Regular equipment includes emery wheel, diamond dresser holder, belts and wrenches.

Distributors In All Principal Cities



### MACHINERY CO.

PROVIDENCE, R. I.



Make sure it is in your production line for 1943. Avey Drilling Machines mean longer operating hours, smoother performance and lower maintenance. They'll do your war job now, your peace job later. We illustrate the Avey Type MA-6 in No. 2 size (capacity in cast iron, ½1). One to six spindle units, either size. Six speed machine, two speed motor, three mechanical changes through gearing, 8 to 1 speed range. Push button control. MA-6 illustrated, has three spindles, the Aveymatic Feed, Hand Feed and Tapper.





### SUPER TOOL CO.

21650 Hoover Road

Detroit, Michigan

#### CARBIDE TIPPED TOOLS

FOR TURNING . FACING . REAMING . SPOTFACING . BROACHING FORMING . GRINDER RESTS . WEAR PARTS . BORING . MILLING . DRILLING GROOVING . COUNTERBORING . SHAVING . CENTERS . SPECIAL PURPOSES



# GREENERD ARBOR PRESSES

For Precision Press-Fit Aircraft Assemblies

Above: The No. SS Press if 12 Tons capacity. The combination of Green-rd gearing and Timken searings makes it possible to obtain 12 tons ressure with little effort. Receives diameters in to26 inches. Largest nandrel, 4 inches. Maxiaum height over plate, 10 inches.

Jelow: The 6 Ton Freenerd Hydraulic ress No. H-57 is selfiontained, with presure control from ½ to i tons on the down troke. Stroke of ram is idjustable from one to 6 inches. Working able 10<sup>8</sup>x10<sup>9</sup> with 2%<sup>8</sup> ored slot.



In the assembly of precision parts for aircraft engines, Greenerd Arbor Presses are used for inserting the main copper-lead bearing shell and for pressing the knuckle pins into the connecting rods of Wright radial engines. At Pratt & Whitney, similar operations are performed in the assembly of Wasp engines.

Greenerd Arbor Presses, in capacities from 1/4 to 30 tons, are made in both hand-operated and hydraulic models covering every press need from fine instrument assembly to broaching and straightening. Their rugged construction is borne out by the fact that presses made by us 59 years ago are still giving good service. Write for new complete catalog No. 38H.

#### GREENERD ARBOR PRESS CO.

The Originator of the Arbor Press in 1883

NASHUA

NEW HAMPSHIRE

# SHOWS HOW GREEN MEN CAN MACHINE ANGLE JOBS

#### with UNIVERSAL 3-Way Angle-Set Precision Vises

Angle jobs need not require the full time of your highly trained men, or hold up production and tie up special machines. With UNIVERSAL 3-Way Angle-Set Precision Vises on your production lines, you can handle any kind of single or compound angle work at mass-production speed and cost—and put it on r

standard miller or drill press! This free folder shows the way.

With their full three-way adjustment— 360° rotation on base, 90° tilting on upper and lower cradles — UNIVER-SALS convert old standard machine tools into universals! Further, UNI-VERSALS slash set-up time, eliminate need for costly fixtures in angle work, cnable inexperienced workers to become

"experts" at angle machining! The folder tells how many big war production plants are using

You can get immediate delivery of your UNI-VERSALS by sending your order now, accompanied by priority rating. The price is only \$160 FOB Parma, Michigan. Terms: 27%, 10 days; net, 30 days.

#### 12 JOB SET-UPS SHOWN!

SEE HOW UNIVERSALS can do these things in your own plant, in the hands of youngsters! This free folder gives complete details and specifications. Twelve installation drawings show actual production set-ups. Send the coupon for your copy today.

for your copy today.

CUPON NOW!

UNIVERSAL VISE AND TOOL COMPANY 133 Main Street, Parma, Michigan

₹ 360

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Provide an accurate, rigid surface for inspection, layout and assembly. Depend on Challenge Bench Plates—made of special analysis semi-steel—all sides machined at right angles to the top. Precision

ground — two, four, and six inches thick — wide range of sizes. Also available in planer finish. All plates have heavy ribs on the underside. Send for latest Challenge catalog containing complete information.



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A precision surface for tool making and inspection. Used as master plates for testing and checking purposes. Made of strong, close-grained semi-steel, specially treated to overcome strains in casting and machining and to avoid distortion after scraping. These plates have

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THE CHALLENGE MACHINERY CO.

GRAND HAVEN', MICHIGAN, U.S.A.

### CIRCLE "R" METAL CUTTING SAWS

#### NO WONDER THEY'RE GOOD

This company has been making circular metal cutting saws since 1923, when it was founded, and all its officers and employees were experienced saw makers for a long time before that. Almost all of our factory space, 20,000 square feet, is devoted to this one product.

So it is a fair assumption that we "know" circular saws. In fact we have to, because our reputation depends chiefly on this one product. No wonder circle "R" saws are good!

Have you tried them? If not, send for our Catalog K.



#### PRECISION CONTROL

of manufacturing is another reason why Circle "R"saws are good. Our modern heat treating ovens have potentiometric control, — the most accurate method for the purpose.

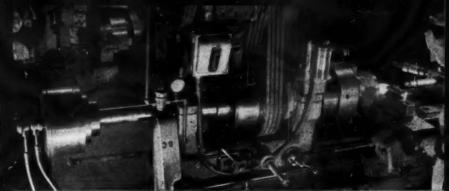
#### CIRCULAR TOOL CO., INC.

PROVIDENCE, RHODE ISLAND
CHICAGO · PHILADELPHIA · NEW YORK · DAYTON · CLEVELAND
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# How to Make How to Make PRODUCTION EQUIPMENT of your old Lathes



This World War I lathe, now fitted with an "Airgrip" air cylinder, is in a World War II mass production line.

#### Output Can Be Increased 25%, or More

You can make production equipment out of your old lathes—increase their

Anker-Holth air cylinders step up production more than 25%.

output more than 25%—by fitting them with Anker-Holth high speed revolving air cylinders and air operated chucks.

And, you do not have to wait

to take this progressive step, because most sizes of "Airgrip" air cylinders are available on reasonably prompt delivery.

When you check air cylinder requirements with us, also investigate Anker-Holth air operated universal three-jaw chucks, collet chucks, expanding arbors, and shell holding equipment. They will help you do more work—at lower cost!

#### Anker-Holth Mfg. Co.

"AIRGRIP" CHUCK DIVISION
332 So. MICHIGAN AVE. CHICAGO, ILL.



Meehanite • Rigid • Hand Scraped to .0001 accuracy • Thoroughly Seasoned • Perfect Right Angle • Elongated Slots 5/8"x4" • Surface Plate 24"x36" • Angle Plate 18"x19" • Let us tell you of the many advantages of our new Combination Master Surface-Angle Plates

#### Thomas Wilberton & Company

CEDAR GROVE, NEW JERSEY

#### By-pass production line jams-

MANY war plants are getting around production tie-ups by putting versatile Walker. Turner Metal-Cutting Bend Saws at congested spots to relieve overworked, heavier cutting machines.

Aircraft plants use them for cutting bamber noses and other bulky members. Die makers profile irregular dies with great time savings. Tool rooms, machine shops and metal working plants find them indispensable for cutting sheets, rads and tubes of steel, iron, aluminum, brass, elloys and compositions—quickly, accurately, economically.

Beck-gearing and cone pulleys provide speed range from 61 to 5300 s.f.p.m. Sturdy, compact, easily operated, fully safeguarded. Available in 14-inch and 16-inch models for prompt shipment to war industries."

WALKER-TURNER CO., INC. 1713 BERCKMAN ST. PLAINFIELD, N. J.





# John Son Furnaces

NO. 130 A

Firebox 7 in. high 13 in. wide, 16½ in. long For more than 40 years, industry has enjoyed faster, more profitable operation with Johnson Furnaces.

No. 130 A, left, for quick heat-treating hi-speed steels. Counterbalanced door opens upward, allowing tools to be placed in or removed from furnace without fully opening door, thus preventing temperature drops. Carbofax hearth and ½ H.P. blower. Lined with insulating refractory. Available with 4 or 6 burners for various temperatures from 1400 degrees to 2400 degrees F. 4-burner job illustrated, \$295.00. 6-burner job, \$325.00. All prices F.O.B. factory.

NO. 120 HI-SPEED STEEL HEAT-TREATING FURNACE Exceptionally fine also for hardening dies, tools and punches. Equipped with 6 E. motor and Johnson Blower. Heavily lined throughout with insulating refractory. Carbofrax hearth. Temperature regulation easy with air and gas adjustment. \$192.50 F.O.B. factory.

NO. 130 HEAT-TREATING

Use for quick, high, accurate temperatures for hi-speed steels, also for clean heating of all types of steel. Carbofrax hearth, heavy insulating refractory lining, G. E. motor and extra large Johnson Blower are all standard equipment. \$248,00 F.O.B. factory.



JOHNSON GAS APPLIANCE CO.

584 E AVE. NW., CEDAR RAPIDS, IOWA

#### 48-HOUR SERVICE ON BUR RESHARPENING

WITHIN 48 HOURS after your worn fluted burs arrive at Pratt & Whitney, they'll be on their way back to you . . . razor-sharp, shanks trued, "diamond blue" heat treated,\* and hungry for more work.

READY AND WAITING to serve you at P&W is a large force of welltrained, highly-skilled men and women, carefully chosen for their keen eyes and steady hands.

THEY'LL PUT YOUR WORN BURS—any brand or type—through the Kellerflex Resharpening Process... a typical P&W "accuracy" operation in which flutes are ground to their original pattern, depth, helix angle, and relief.

P&W KNOWS BURS... makes them by the hundreds of thousands. This means quality resharpening. P&Wresharpened burs are warranted to deliver service as good as new.

DON'T RIDE A BUR TOO FAR... a dull bur slows production; continued use of a dull bur reduces its potential resharpened service-life. Send P&W all your burs as soon as they lose their bite.

SEND P&W YOUR DULL BURS... and call on our Kellerflex Sales Department for help on any burring problem.



P&W resharpened bur back on the job (removing surplus magnesium). Within 48 hours after it arrived at P&W's Receiving Room, it left Shipping, good as new.

#### Also available... CONVERTING & RECONDITIONING

New flutes can be ground on hand cut burs or burs which have been worn and resharpened "right down to the gums" by P&W Converting and Reconditioning Service. Cost less than new burs...serve as well. Write for details.

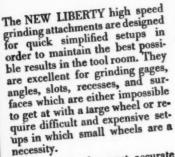




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Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT



Designed for the most accurate service in grinding tools and various kinds of mechanical equipment.

SEND FOR CIRCULAR GIVING FULL DETAILS.

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TOOL AND GAGE WORKS

#### Speed Up Grinding Production



#### MEYERS "DIA-BRASIVE" RADIUS-ANGLE FORMER

\* Speedy, precise and economical forming of grinding wheels—from any angle—is now possible with this precision tool. Difficult radial and angular outlines are quickly formed. Engineered to perform with absolute precision. Vertical and straight diamond dresser nibs furnished as standard equipment. Write or wire for literature and prices.

#### **Multiple Diamond Point Dressers**

Efficient—economical. Small stones cost less, and remain sharp longer. Numerous sharp points are always exposed to work, or face of wheel. New points secured by turning dresser a quarter rhalf turn. Special dressers made to order.

Aggressive manufacturers' representatives wanted in South, East and West.

W. F. MEYERS COMPANY, Inc., Dept. BB, Bedford, Ind.

#### H.R.KRUEGER & Co.

1469 E. GRAND BLVD. DETROIT

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DEEP HOLE DRILLING MACHINES.

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SPECIAL DRILLING MACHINES

HYDRAULIC UNITS 1 H.P. 5" STROKE.

MULTIPLE DRILLING & TAPPING HEADS.

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MANUAL OR POWER - UP TO 48" DIA.

20" 24" FEEDEX MACHINES

WITH CAM FEED & AUTO. INDEX TABLES.

GUN DRILLS
TIPPED WITH CARBIDE OR
HIGH SPEED STEEL.

#### " $W_{e\ knew\ that\ NOPAK^*}$ would do the job 100%"

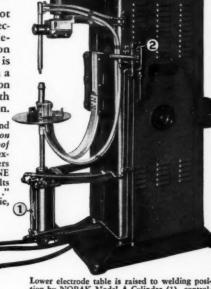
#### ... says designer of Rex Spot Welder

The Rex Air-Operated Spot Welder, with movable lower electrode table, was specially designed for the quick insertion and removal of bulky work. It is reducing spot-welding time on a certain war-production operation from 50 to 12 seconds ... with better uniformity and precision.

Read this: - "only air cylinders and valves manufactured with precision and care, and absolutely leakproof could be used. We knew (from experience) that NOPAK Air Cylinders and Valves would do the job ONE HUNDRED PER CENT. The results obtained proved we were right . . . (signed by the inventor) J. A. Fotie, President of Dyer Welder and Engineering Co., Kansas City, Mo.

Mr. Fotie's experience suggests how standard NOPAK Valves and Cylinders can help you speed-up machine movements in your plant.

GALLAND-HENNING MFG. CO. 2754 S. 31st St., • Milwaukee, Wis.



Lower electrode table is raised to welding posi-tion by NOPAK Model A Cylinder (1), control-led by NOPAK 4-Way Hand Valve (2). Upper electrode is lowered by NOPAK Model D cylinder (3), inside of housing controlled by NOPAK Model R Foot Valve (4). A successful application of air power to rapid, precise machine movements !

PA N VALVES and CYLINDERS

SIGNED for AIR or HYDRAULIC SERVICE



# DESSAU DIAMOND TOOLS

... dependability based on over 100 years of specializing in Quality Industrial Diamonds.

Dessau performance, dependability and long-range economy result from expert personal analysis of the work every tool is to do, plus painstaking selection of quality Diamonds and efficient tool engineering, especially for the job.

It makes every Dessau an individualized, personalized tool, specifically built for your make of grinder . . . or to meet your special diamond tool requirements.

It will pay you to get the facts on Dessau personalized service.

Large, Complete Stocks. All Dessau Diamonds are direct importations from The British Diamond Syndicate, London. Send for latest circulars giving full details on Dessau products, and Dessau Personalized Diamond Tool Engineering Service.



#### MAURICE S. DESSAU CO.

Industrial Diamond Importers

Diamond Tool Manufacturer

35 FIFTH AVE. . Tomatone Pandente & 1877 . NEW YORK, N. Y.

"Dessau Diamonds True the Wheels of Industry



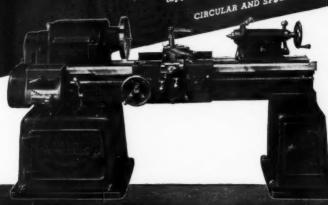
PEAK OF PERFECTION LAT

TIMKENIZED SPINDLE PRECISION BUILT MODERN DESIGN AUTOMATIC FEEDING TAIL STOCK

Apex Lathes of modern design, built in two Apex Laines of modern design, built in two sizes, either 14° or 16° swing by 6' or 8' sizes, either 14° or 16° swing by beds of bed lengths, with extra wide beds and bed lengths, of semi-steel. Planed and ample weight of semi-steel ample weight of semi-steel semi-

Head stock is equipped with precision tapered Timken Bearings, heavily content to the tapered With large hole throughout. Thread Chasing Dial conveniently located Thread Chasing Dial conveniently located throughout. Tapered Gibs throughout, on carriage. with easy adjusting screws. Tailstock With easy acquising screws, ransions Spindle is graduated and has a patented Spindle is graduated and has a patented exclusive feature of an automatic tailstock feeding device for drilling, boring, or tapping of large or small holes.

CIRCULAR AND SPECIFICATIONS



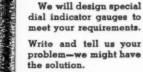
MACHINE TOOL CO SAN FRANCISCO, CAL.

# T RITON

The fundamental basis of all war production is precision and speed.

Substitute your flush pin gauges, snap height gauges, etc. for special dial indicator gauges. They are:

MANY TIMES FASTER IN OPERATION. NEVER WEAR OUT. MAKE NO MISTAKES IN READING.



SPECIAL TOOLS
RING GAUGES
PLUG GAUGES
SNAP GAUGES
AND SPECIAL GAUGES

PROMPT DELIVERIES

TRITON PRECISION

CORD.

GAGE AND TOOL

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1302 INWOOD AVE. N.Y.C.

## THE NO. 3 WIGGLESWORTH SMALL MILLER

A NEW HIGH SPEED SMALL PARTS MILLER WITH AUXILIARY POWER FEED



MOTOR IN BASE DRIVE . TIMKEN BEARING SPINDLE SIX FEEDS AND SPEEDS . BUILT IN ACCURACY WRITE FOR FOLDER

#### WIGGLESWORTH MACHINE TOOL CO.

### SHARP-TOOLS IN A HURRY! Plowest COST WITH TOP-MOST ACCURACY AND SPEED

#### HILCO CUTTER-GRINDER UNIVERSAL



Keep all your cutting tools always sharp! Keep production at top pace! Avoid "dull tool" delays and losses! The HILCO Universal Cutter-Grinder will sharpen your tools in a fraction of the time required by any other type grinder. No costly set-ups-no waiting - utmost flexibility - low initial cost, only \$495.00 — lowest operating cost. Revolutionary in design and operation.

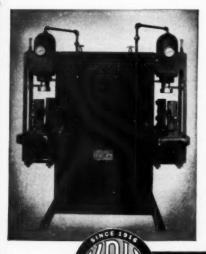
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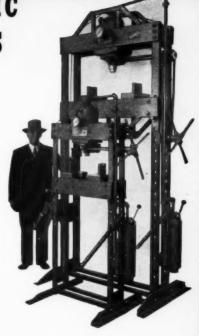
ERCO MANUFACTURING CO. 423 WEST SUPERIOR ST. Phone: SUPERIOR 910 CHICAGO, ILLINOIS

#### KRW HYDRAULIC ARBOR PRESSES

#### for War Production

Standard Hydraulic Presses in 25, 50 and 75 ton capacities. Special Presses engineered for specific war production needs.





The exclusive design features which have given KRW Standard Presses their reputation for speed and efficiency are available to war production manufacturers who require presses of special design. The illustration above shows a special, extra high 75 ton KRW Press in comparison with the Standard 25 ton unit. Opposite illustration shows a special, 4-man operated, air-oil Press used for bomb loading.

... KRW also builds bench-type Arbor Presses in 1/2, 1 and 3 ton capacities.



#### IT'S NEW

ALCO
RELEASING TYPE
TAP HOLDER



Now ready — A Releasing Type Tap Holder for hand screw machines and turret lathes.

This new tool has been developed and perfected to meet the same rigid standards which are incorporated in the standard tools in the Alco line.

Two years have been spent in perfecting this new tool so that you can be assured of immediate reductions in operating costs and improvement in product quality.

Prompt shipments can now

be made.

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be made.

New Alco catalists avail.

New Alco catalists avail.

New Alco catalists avail.

Illustrates and his new Re.

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If you have an older cat.

If you or if you require additional capies of catalog.

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No. 3, please write.

#### CHECK THESE SUPERIOR FEATURES:

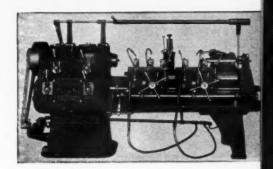
- √ No bushings are required.
- √ Absolute concentric alignment on all work.
- Right or left hand threads are cut without any internal change in this remarkable tool.

ALCC==T>00LS

THE ALCO TOOL CO., 252 Birdseye St., Bridgeport, Conn.

Detroit Office-908 Stephenson Bldg.

A RUGGED, SEMI-AUTOMATIC OF PROVEN DESIGN. PROVIDING A RAPID METHOD OF TURNING EITHER LARGE OR SMALL LOT PRODUCTION



The Lo-swing Lathe principle differs basically from the conventional lathe in that multiple tools cut simultaneously. In Lo-swing design, the cutting points of the tools are always close to the carriage ways - eliminating all possibility of their springing away from the work. The Loswing Steady Rest, likewise, prevents the work from springing away from the tools.

By the Lo-swing method, the total turning time is only the actual time required to make the longest individual cut. As many tools can be used as the job requires, all cuts being accomplished at one passage of the carriage, the travel of which is usually but a fraction of the length of the work itself.

Lo-swing Lathes are made in two standal sizes: 4-inch and 8-inch. Their design makes them particularly suited for t rapid turning of shafts up to 8 inch d meter by 132 inch length, in the standa models. Routine operations include tur ing several diameters, both straight at taper, squaring shoulders, necking f grinding and making form cuts. Pow operated tools on a rear carriage are pi vided when necessary.

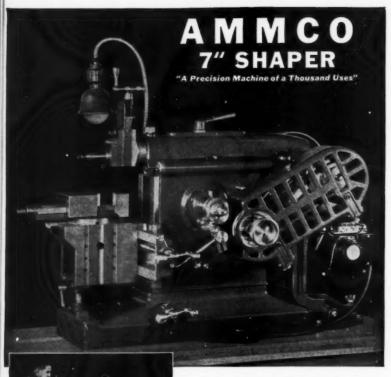
Adequate equipment for all ordinary wo is available in standard accessories. F large lot production special tooling ebe furnished to further increase produ tion economies. Regardless of how coplicated the tooling, the Lo-swing quickly set-up for different jobs.

#### SENECA FALLS Automatic WORK DRIVER



Self Centering ... Quick Acting ... No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces-straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO.



#### IT'S PORTABLE

-- Saves Steps and Time --

Don't tie up a big shaper when so many jobs can be done just as accurately and much quicker and more economically on the AMMCO 7" PRECISION SHAPER.

Available for stationary installation or mounted on portable cabinet easily rolled to the mechanic's workbench...Write today for specifications and prices.

AUTOMOTIVE MAINTENANCE MACHINERY CO. 2106 Commonwealth Avenue North Chicago, Ill.



The "Straight-Line" Cutter may have either a continuous series of teeth or be of the gap-type as shown. In the latter case each group of teeth cuts a complete gear or pinion.



The Fellows Straight-Line Gear Generator employs a rack-type cutter which as easily can be ground in non-involute form as to involute profile. This is of especial interest to makers of



Watches Clocks Meters Cameras

Projectors Indicators Range Finders Shell Fuses

Instruments

High-accuracy parts, made to Fellows precision standards, can now be produced at rates which compare with or exceed sub-press output. For details, write for the Straight-Line Gear Generator Bulletin.

THE FELLOWS GEAR SHAPER

### THE GLENGO-

COMPENSATING TOOL HOLDER

Produces true and accurate holes by correcting machine tool misalignment on hand screw machines, automatic screw machines, tapping and drilling machines of all kinds, and multiple spindles.

Available in stock are five standard sizes of holders with taper or straight shanks, with capacity up to 5" tool diameters. Prompt make-ups on larger or special holders are easily accomplished and our times to assist you in solving your special problems.

SEND FOR BULLETINS ON ALL OUR UTILITY TOOLS

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THE J. C. GLENZER CO., INC.

6465 EPWORTH BLVD.

DETROIT, MICH.



# THE Bridgeport TURRET MILLING MACHINE

#### Rigidity and Flexibility Unparalleled Range

The most difficult milling, drilling and boring jobs are easy with the new Bridgeport. Here are a few of the advanced modern features that make such performance possible.

Angular settings in one plane are achieved by turning the hand wheel which controls the keyed overarm. Turret diameter is 15° with 5° overarm.

Column, knee and table construction are rugged with wide ways and taper gibs for accurate and vibra-

tionless operation. Table, knee and saddle locks are located in front for easy accessibility.

Graduated dials are 3% in diameter. Anti-friction bearings are used throughout.

Write for full details.

BRIDGEPORT MACHINES, INC. 52 REMER ST. BRIDGEPORT, CONN.

#### FOR LOWER UNIT COST ON **SMALL PARTS PRODUCTION**

Urgent war needs have stepped up the demand for small parts to such an unprecedented degree that large turret lathes are being tied up when they are sorely needed for heavier work. The Logan No. 830 Hand Screw Machine was developed to break this bottleneck. Engineered and built to exacting specifications, it is capable of accurate, continuous production. With a capacity of %-inch round bar stock. It turns out parts with the same speed and precision as that of the larger machines. And, because its cost is low by comparison, unit production costs are further lowered,

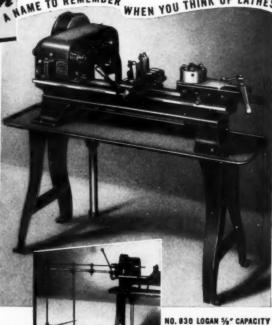
#### NAME TO REMEMBER WHEN YOU THINK OF LATHES

#### SPECIFICATIONS

- 1 Swing Over Bed. 10"
- 2 Bad Length, 431/4"
- 3 Spindle Hole, 23/4," Capacity, 1/6"
- 4 Preloaded Precision **Ball Bearing Spindle** Mounting
- S 12 Spindle Speeds. 30 to 1450 R.P.M.
- 6 Cross Slide Stroke. 314"
- 7 Six Position, Automatic Indexing Turret
- 8 Stroke of Turret, 41/4"



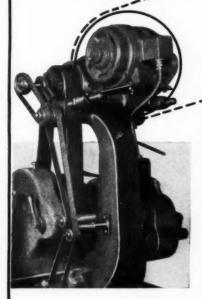
The Logan Bar Feed is offered as an accessory for the No. 830 Hand Screw Machine. Maximum capacity: 3-6" round bar stock. Maximum stroke: 2 inches, Patented safety cam action operates bar feed and collect at unw operation.



HAND SCREW MACHINE

LOGAN ENGINEERING COMPANY . Chicago, Illinois

#### A MACHINE TOOL IS AS NEW AS ITS DRIVE



OUTPUT — not age — is the measure of value of machine tools today. But full output is impossible without a modern, close connected, unit drive. Motorize now, not merely for more production but maximum production. Get a Berkeley—the drive that's built for today's deeper cuts at higher speeds. The Berkeley engineered welded steel bracket makes it the simplest of installations. They fit — every time! Let us tell you why.

#### for

Lathes—Shapers
Planers—Milling Machines—
Punch or Drill Presses—Grinders
of All Types— Any Machine Tool

#### Berkeley

Power Drives

BERKELEY EQUIPMENT COMPANY . 1022 Bahls Ave. Danville, Illinois

THE DRIVE TO Greater PRODUCTION

THIS HONEYCOMB BASE IS THE PATTERN OF

#### PRECISION

IN MEEHANITE METAL



#### SURFACE PLATES

Every factor contributing to accuracy has been incorporated into these surface plates. They are up to one-third heavier than any of the quality surface plates. The honeycomb design base distributes this weight evenly over the entire surface. Hand scraped to extremely close tolerances, of uniform texture, fine close grain, unusual strength and solidarity.

SIZES	APPROX. WEIG	HEIGHT	TOLERANCE	NET PRICE
6 x 6	11 LBS.	21/2"	.0001"	\$ 19.00
8 x 12	38 "	31/2"	.0001"	35.00
9 x 12	40 "	31/2"	.0001"	35.00
12 x 12	50 "	31/2"	.0001"	43.00
12 x 18	85 "	4"	.0001"	68.00
18 x 18	140 "	41/2"	.0001"	98.00
18 x 24	200 "	5"	.0001"	133.00
18 x 36	310 "	61/4"	.0002"	174.00
20 x 30	325 "	51/4"	.00025"	190.50
24 x 24	334 "	61/2"	.00025"	180.00
24 x 36	475 "	7"	.00025"	275.00
30 x 36	510 "	7"	.00025"	345.00
30 x 60	1425 "	10"	.00025"	596.50
31 x 78	2100 "	10"	.0003"	827.00
48 x 96	6000 "	12"	.0005"	1468 00

Other sizes to specification. Angle plates and straight edges of Mechanite metal also available. Good deliveries on most sizes. Write for folder.

Just off the press-Precision Production Tool Catalog No. 42

ACME TOOL COMPANY

200 CHURCH ST. NEW YORK, N. Y.



### 6"BAR HORIZONTAL BORING and FACING MACHINE

#### with Micro-Feed Unit

READILY adaptable to many current production problems, this 6<sup>8</sup> Bar Horizantal Cylinder Boring and Facing machine is available for immediate delivery. Inspection is invited, and we will be glad to discuss its application to your work.

The bed, of massive construction, is heavily ribbed to insure maintained alignment. Standard length of the boring bar, made of turned and ground high-carbon steel, is 17', but lengths up to 24' can be provided.

By means of Simmons Micro-Feed Unit, an infinitely variable transmission, this boring machine offers both fine and coarse feeds ranging from .004" to 1.000" per revolution of spindle. Main drive to the boring bar is obtained through a motor driven, six-speed gear box. Gears are of high-carbon steel and mounted on spline shafts with anti-friction bearings running in oil. Power Rapid Traverse is supplied to the bar in both directions.

#### SPECIFICATIONS

Diameter, Boring Be	IF		****	6*
Travel of bar in one	setting			60
Capacity of facing l	seads.		.9- to	3672"
Widened portion of	bed	- 001		
	21,75	E OR.	, 18.	high.

Write TODAY for descriptive bulletin.

SIMMONS MACHINE TOOL CORPORATION
1725 NORTH BROADWAY,
ALBANY, N. Y.

#### SIMMONS

LATHES . TURRET LATHES . MILLERS . PLANERS . 6" BAR BORING MACHINES

#### **Change in Firm Name**

\*

#### Sav-way Tool and Machining Co.

BECOMES

#### Sav-way INDUSTRIES

In the past this company has been known as Sav-way Tool and Machining Co., engaged in the manufacture of precision tank and aircraft parts . . . a line of gauges . . . and internal grinders.

Today Sav-way is composed of six major divisions:

End Mill

Gauge Internal Grinder Plastic

Precision Production Specialty Engineering

With this change of name and expansion in activities, we announce the opening of our new general offices and main plant at 4875 East Eight Mile.

In addition, two other plants have recently been purchased and a fourth is now in the course of construction. These four plants, together with our physical and chemical laboratory, have been newly equipped with the latest and most efficient machinery to help meet present and postwar needs.

"It will be done" is the significant slogan adopted by the young and aggressive personnel of:

JAVAM INDUSTRIES

4875 EAST EIGHT MILE

DETROIT, MICHIGAN

Representatives throughout U.S.A. and Canada

## \* There's a Reason WHY MARSHALLTOWN PRESSES GIVE YOU

\* BETTER PRODUCTION

★ LONGER LIFE

Yes, you can rely on the performance of a Marshalltown Press—they give you the most for your money, because they are engineered and built for dependable trouble-free service. Features include—more die space, chrome molybdenum cranks, wrist pin connections and many other proven advantages.

Write today for literature about Marshalltown Presses -available in capacities from 5 to 70 tons.



NO. 5 FLYWHEEL TYPE

MARSHALLTOWN MFG. CO.

900 E. Nevada Street

MARSHALLTOWN, IOWA

#### Turning AND Centering



This Combination Tool is the only Right and Left Hand tool on the market. Can be changed from right to left and vice versa in 10 seconds. Replaces 14 tools costing 4 times as much.

Here are some of the multiple operations that can be done with the R and L: Pointing work concentric with turned diameter; drilling and chamfering; turning and forming special shape or end of part while drilling or reaming; turning one diameter—chamfering two corners, facing end of part along with drilling or reaming; turning two diameters while drilling or reaming; turning shoulder concentric with stock diameter.

You can readily see the enormous savings in time, trouble and money that can be effected by the use of R and L Turning Tools.

Write for 44-page booklet describing all the uses of R and L.

#### RANDL TOOLS

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NICETOWN, PHILADELPHIA, PA.

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Made in 4 sizes having capacities:

Straight Threads from  $\frac{1}{8}$ " to  $\frac{1}{4}$ " Straight or Taper Pipe Threads from  $\frac{1}{8}$ " to  $\frac{3}{4}$ ".

FOR

#### Fast, Accurate and Economical Thread Cutting

- Least number of parts.
- Simplest construction.
- Hardened and ground throughout.
- Cut close to shoulder threads without special chasers.
- Easily adjusted for thread size.
- Require no springs to operate movement of chasers.

Send for your copy of Bulletin M-142 on Modern Rotary Type Self-Opening Die Heads.

CONSOLIDATED MACHINE TOOL CORPORATION

MODERN TOOL WORKS

ROCHESTER, NEW YORK

#### The most Efficient LEVEL\_

for your equipment



The illustrations tell much of the story. Designed to align themselves to the most uneven of floors, slipways are around to minimize friction at point of contact with machine base. Positive two-way adjustment with increased limits. Simplest method of setting, and keeping equipment LEVEL. Turn the "hex" screw head and presto!—a level adjustment as precise as wanted.

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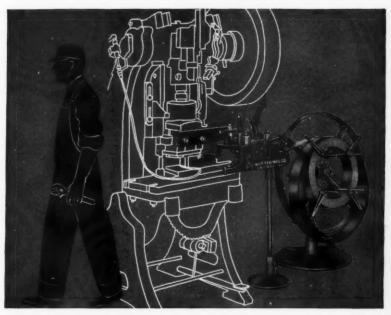
**AVAILABLE IN 3 SIZES:** 

x 41/4" No. 1-2" x 2%6" No. 2-2%" x 3" x 61/8 No. 3-31/6" x 4"

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WAR PRODUCTION rolls out faster with

### WITTEK Automatic ROLL FEEDS AND REEL STANDS



The major problem confronting industry today is increased war production. Manufacturers of metal stampings must recognize automatic feeding of coiled strip stock to punch presses as vital to the solution of their problem. Wittek Automatic Roll Feeds and Reel Stands are designed and built by engineers with years of experience to guide them. With Wittek you can conserve man-hours and maintain new high production schedules.

**★ Write for Descriptive Catalog** 

WITTEK MANUFACTURING CO., 4305-15 W. 24th Pl., Chicago, Ill.

#### POWER SCRAPING

FASTER, EASIER, BETTER WORK

SPEEDS UP Production





Write for Folder giving complete information The Anderson Power Scraper has a "natural hand control"... is as easy to use as a hand scraper. The left hand, as with a hand scraper, serves as a guide to the blade... the right hand controls the stroke. Pressure of the left hand controls the depth of the cut, but the forward cut requires no backbreaking labor. A slight forward pressure on the cylinder with the right hand starts the swift, smooth forward stroke which can be regulated from nothing to 3½ feet ... 60 ft. per minute, reverse speed 90 ft. per minute. The operator can work at a steady rate without tiring as the ½ h.p. motor does the heavy cutting. With this machine one man can do the work of several.

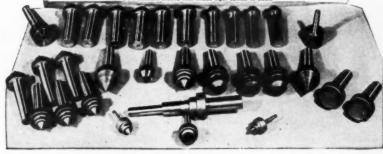
The Anderson Power Scraper, mounted on an elevating truck can be easily moved to any location. The machine may be plugged into any handy electric lamp socket and be ready for use. In the scraper housing directly across from the motor is a scraper blade grinder... a convenient, speedy means of resharpening scraper blades without leaving the machine.

ANDERSON BROS. MFG. CO. ROCKFORD ILLINOIS, U. S. A.





that compensates for expansion due to heat, shock and excessive thrust foods—reducing wear to a minimum. A properly engineered live ceater is one of the fundamentals of setting up a jub and requires a specialist's experience process to the control of the contro



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#### JOHNSON CUT-OFF BAND SAW

Plant production men working on "impossible" completion schedules know and appreciate the Johnson Saw. Set-ups require only a minute or two, cutting action is fast and continuous. Unlimited adaptability and flexibility for handling almost all kinds of cutting. 3-point base makes special flooring unnecessary.



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 More machine tools can now have the many advantages of a motorized variable speed drive that provides all the important "in-between" speeds. Operator can choose exactly the best speed for any size, type and diameter of material in work by turning handwheel while his machine is running. No special support or bracket necessary. Gives smooth, vibrationless transmission of power, regardless of type of work. Eliminates old-fashioned lineshafts and belt shifting. Permits moving machines for most efficient shop layout. Complete information in illustrated bulletin MT-72 "New Utility for Machine Tools," Send for it.

REEVES PULLEY CO., Columbus, Ind.

REEVES

Compact assembly of constant speed motor, variable speed unit and mounting bracket for attaching to most machine tools by four ap screws.

NOT JUST A

FEW SPEEDS.

BUT ANY SPEED

YOU NEED!

MACHINE TOOL DRIVE

### THE IMPROVED LINLEY HIGH-SPEED VERTICAL MILLING MACHINE AND JIG BORER

#### A COST-CUTTER ON SMALL PRECISION WORK LARGER TABLE AND MORE CLEARANCE



This new machine pays for itself on die, jig and fixture work as well as molds for plastics, metal pattern work, laying out, drilling, milling and boring operations.

Fast and simple with correct speeds to insure safety to tools. Ball bearing equipped; micrometer screw feed head.

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## Ettco-Emrick HIGH-PRODUCTION DRILLING AND TAPPING EQUIPMENT



### TAPPING ATTACHMENTS

Make a high-speed, sensitive tapper of any drill press. Quickly mounted without altering press. 7 sizes, for No. 0 to 1" taps. QUILL CLAMPS available to assure absolute rigidity. For full detalls, write for Bulletin No. 2.

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Highest production system for drilling and tapping. Makes it possible to drill or tap maximum number of holes simultaneously. Heads made entirely of standard parts. Can be used on drill press or tapping machine. QUILL CLAMP furnished with every head. For full details, write for Bulletin No. 3.



### **∠VISIBLE GRIP TAP CHUCKS**

True centering on round and positive driving on square assured because operator can see grip when inserting tap. 5 sizes for No. 0 to 1 taps. Details in Bulletin No. 6. Collet type tap chucks available for No. 6 to 3/4" taps.



Has hair-trigger sensitive central friction clutch. automatic reverse and sensitively counterbalanced foot pedal. All the operator has to do is feed the work and step on the pedal. Unskilled operators can maintain production rates up to 12,000 holes per hour. For full details, write for Bulletin No. 4.



### **←KEYLESS DRILL CHUCKS**

Speed up drilling and save energy by eliminating the non-productive key-tightening operation. Also end slipping and re-tightening. Highest quality precision construction. Good for long, hard service. 5 sizes for No. 0 to 5/8 drills. Also stocked for portable drills. For full details, write for Bulletin No. 6.



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Detroit Chicago



# NO.2 AMERICAN PLAIN MILLING MACHINE



### PROMPT DELIVERY

MOTOR IN BASE DRIVE

INFINITE SPINDLE SPEEDS

STANDARD SPINDLE NOSE

HEAVY RUGGED CONSTRUCTION

CENTRALIZED CONTROLS



SEND FOR DESCRIPTIVE BULLETIN

J. L. LUCAS and SON INC. Bridgeport, Conn. U.S.A.

# "It Gives us Better **Tapping in Less Time**

Ask any production man in a shop where Procunier Tapping Machines have been given the acid test for years. Invariably you will get a story of increased output, more accurate tapping and greatly increased tap life. You will be told that the Procunier Tapping Head stands up year after year under the tough grind of production work-and quickly pays for itself in greater production. That's why Procunier Tapping Machines are being used by the most exacting production shops of this country.

### Definite Reasons for This Superior Performance

The features that make better tapping possible include: 1. Four speeds, ranging from 390 to 2050 RPM. efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No.2 to 1/2" through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand screw adjustments, maintain pre-set tap feeding and reversing pressure INDEPEND-ENT OF OPERATOR.

SEND FOR CATALOG giving full details, description and prices on the full line of Procunier Universal Tapping Machines, hand or foot opera-

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SAFETY CHUCK COMPANY 14 S. Clinton St., Chicago, III

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Procunier Safety Chuck C	ompany
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	High Speed Tapping Heads
☐ Tru-Grip Tap Holders	Universal Tapping Ma-



# now to more Quickly

with these NEW DELTA
POWER FEED
DRILL PRESSES

You can get more output from the same number of operators by utilizing low-cost DELTA Power-Feed Drill Presses. They permit operators to perform additional jobs while the power-feed works automatically and quickly pay for themselves. And here's important news: These new Delta Power-Feed Drill Presses are priced considerably lower than the customary price ranges for drill presses of this quality.

### **Many Outstanding Features**

The unusual design of the Delta Power-Feed unit, which operates directly off the bottom drive of the motor instead of off

the spindle, makes possible a wide range of feeds, from .0010 to .016 inches per revolution of spindle in the Slow-speed drill presses and from .0005 to .009 in the High-speed machines. Has many other special features.

This new line includes single and multiple spindle 17\* units, in slow speed and high speed models, with table raising or head raising mechanisms, powered with either Delta or standard NEMA frame motors.

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Ask your nearest Delta Industrial Distributor for specifications and prices or write direct to us.



The Delta Manufacturing Co. 604-A E. Vienna Ave., Milwaukee, Wis.

Please send me Special Bulletin on the new line of Delta 17-inch Power-Feed Drill Presses.

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Model AG3M



COOLANT PUMPS Illustrated is Model AG3M motor driven coolant pump. Hardened steel sleeve shaft slips over motor shaft. Can be replaced easily. Spring tension packing eliminates adjustments and insures long life. ¾ to 1 h.p.

Capacity 25 to 80 gal. per minute.



Specialties Co., Inc.



"MATCH THE MACHINE TO THE JOB - use fast precision bench tools to take over the production of small parts so that capacities of larger machines will not be wasted." That Atlas idea is helping thousands of plants, large and small, step up production in the victory program. And an important tool in the production drive is the Atlas Milling Machine,

HERE is a real bear for precision work — rugged, compact, powerful. It handles the full range of milling — from slabbing and facing cuts to end milling, keyways,



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LATHES

SHAPERS Backgeared. Handle all work screw-cutting within a 7"

V-belt drive, power cross rately, quickly,



DRILLING MACHINES

Step up production on small-hole drilling, tapping, 4, 3, 1 spindle models





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Dependable delivery on Boice-Crane tools—often only a matter of days—never over a few weeks. Why wait 6 to 12 long months for big, heavy, costly tools that never can handle light jobs as efficiently anyway? Oughtn't you get our literature too and start tooling more light drilling, tapping, and cutting jobs this quicker, cheaper way?

Folder No. 1 lists over 60 Boice-Crane Drill Presses to 1/4" and Tappers to 1/4" capacity. No. 2 covers our 8-speed All-Purpose 14" Band Saw.

### They Tell You How To Keep Your Big Machines Free For Big Work



The most logical thing in today's forced production is to use your large, hard-to-replace machines on large operations only. Load the smaller jobs on lighter, speedier, less costly and easier-to-get Boice-Cranes, and the benefits double up. Get more out of your big machine—and the EXTRA saving of running the lighter jobs at reduced cost on a machine designed especially for that class of work.

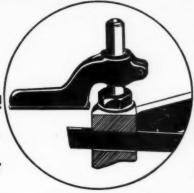
The Boice-Crane 8-Speed Band Saw Cuts Everything

The new Boice-Crane is the perfect 14° band saw for production, tools, dies, foundry and experimental work. 8 speeds cut many materials. Powerful gear drive.

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BOICE-CRANE COMPANY TOLEDO, OHIO



THE TOOL HOLDER WITH A STEADY-REST

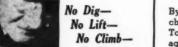
PERFECTLY ON POWER **CROSS-FEED** 

WORKS

### Simplifies Cutting-Off In Lathe!

You'll get the surprise of your life when you change over to the Lombard Tool Holder for cutting-off in a lathe -because this new-type tool holder eliminates entirely the tendency of the stock to jump, or lift, or climb on the tool.

The secret lies in the Lombard's exclusive feature called a "STEADY-REST"-a sturdy bar that rides over the work, holding the work down so that the tool cuts smoothly through the stock-as smoothly as a butcher knife cutting through cheese.





### Quickly Pays for Itself!

By making it impossible for the tool to chatter or dig into the stock, the Lombard Tool Holder eliminates both tool-breakage and stock-spoilage. These two big savings pay for the holder in a surprisingly short time.

### PRICES

Extra Heavy Duty Models For 12' to14' \$16.75

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## CONWAY CLUTCHES

BE FREE IN '43 of all clutch worries...let CONWAY CLUTCHES get on the job. Whether in your own plant or in other installations you can depend on these great clutches because of their trouble-free operation and scientific designing to carry or transfer the desired power.



Patented in U. S. and Canada

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Full floating plates, high ratio leverage, easy engagement, instant release, drag-free idling, quick mounting.

STANDARD MODELS of catalog dimensions can be delivered promptly. Write us for full catalog data.

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### GRINDING WHEELS.

now more than ever, demand the most careful selection. Canservation should be the ever-watchful password in every foundry, toolroom, factory grinding department or machine shop.

We are at your command day and night, to make certain that of the hundreds of grit — hardness grade — and porosity combinations, your selection will be the one that will give you a greater and more rapid production with the maximum amount of grinding efficiency at a minimum cost.



CONTROLLED POROSITY, FRACTIONAL GRADES, H9 VITRIFIED BOND, three of our many outstanding features, assure a definite start in this direction. Consult BAY STATE and be sure!

# BAY STATE

ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

# PURE TUNGSTEN CARBIDE DIAMOND METAL HONES

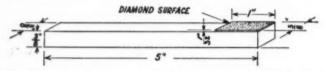
\$12.00 EACH

### SUPPLIED IN THREE DIAMOND GRIT SIZES

No.	1	COARSE	100	GRIT	DIAMOND
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N.	3	CIME	EA	CRIT	DIAMOND

WHAT THEY DO: To resharpen carbide tools. Stoning small radii on carbide tools. Dressing short angles or small radii on diamond wheels or abrasive wheels.

These hones are very fast cutting and have an extremely long shop life. They are very difficult to harm in ordinary use. Use kerosene or light oil as a lubricant. To resharpen, bring diamond face lightly in contact with a silicon carbide wheel for about 30 seconds to one minute. The silicon carbide wheel will grind out a small amount of the Tungsten Carbide binder and re-expose the diamond particles.



Lasts from five to ten times longer than Bakelite Diamond Hones. A trial order will convince you of their worth.

### IMMEDIATE DELIVERY FROM STOCK.

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GENERAL TOOL & DIE CO.

555 Prospect St.,

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# INCREASE TAP LIFE 1000% with the Blake Tap Grinder

**Dull taps are not scrap taps** when you have a Blake Tap Grinder on the job. This machine sharpens taps on the chamfer so that from 2 to 10 times more tapped holes are obtained from taps that formerly went on the scrap pile.

You **profit four ways** with the Blake (1) you conserve scarce High Speed and Carbon Steels, (2) you increase tap life up to 1000%, (3) you avoid the delay caused by waiting for new tap delivery. (4) you maintain the accuracy of your products.

The Blake Tap Grinder (formerly called the J-B) will grind the chamfer on rightor left-hand taps with 2, 3, 4, 5, 6, 8 and 10 flutes. Capacity—No. 0 to 2\*.

Many manufacturers are getting added profits from their Blake Tap Grinders by sharpening countersinks and other small tools on this versatile machine.

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CITY..... STATE.....

### EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

BLAKE TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — L & D HIGH SPEED DRILL PRESSES

### ELIMINATE

# the Common PRODUCTION

Dust laden air curtails production. Why tolerate it? Capture it at its source with a Kirk & Blum Down-Draft

Dust Control System.

In the machine tool industry, where nothing must interfere with the operation of production equipment, Kirk & Blum Down-Draft Dust Control Systems are the solution to dust problems.

Floor and bench-high grills capture dust from grinding and sanding operations right at the source. Under-the-floor ducts carry it outside. There's no overhead piping to clutter up much needed space.

Our engineers will analyze your problem and submit recommendations. Consult them today, there's no obligation.



### Send for any of the booklets:

- "Dust Collecting Systems in the Metal Industries"
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THE KIRK & BLUM MANUFACTURING CO. 2834 SPRING GROVE AVE. CINCINNATI. OHIO

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# THE NICHOLS HAND MILLING MACHINES

Give you full advantage of high cutting speeds

Engineered for volume production of small parts with high-production tool efficiency and economy • Speedy Setup • High Precision • High Speed • Rugged design and durability make it ideal for small parts milling.

May we send you illustrated bulletin?

#### SPECIFICATIONS

Longitudinal feed, 10°. Transverse feed 7°. Vertical feeds of knee, 13½°. Vertical movement of head, 4½°. Micrometer dials on Transverse and Vertical feeds. Spindle speeds 100, 200, 600 and 1200 r.p.m.



WALTHAM, MASS., U. S. A.





### PNEUMATIC TOOLS

★ More and more the man behind the machine is a WOMAN... And ARO is ideal for women who do small tool operations such as drilling, grinding, filing, screw driving, sanding and others.

ARO Rotary Pneumatic Tools are simple in design...rugged in construction...deliver unusual power...yet are extremely light in weight. The ARO grip fits comfortably into women's hands.

Greater production is turned out with less operator fatigue. Both precious time and money are saved over hand methods and the use of larger tools...Send for new ARO Catalog.

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Province Tools...Lubricating Equipment...Aircraft Products

### LINES BEHIND THE LINES

"ALL THIS AND TIRES TOO!" SAYS THE 100% CONVERTED RUBBER INDUSTRY, NOW MANUFACTURING IMPLEMENTS OF MECHANIZED WAR





MACHINE
(right), America made

BROACH DE- V-1½-4 ton,
SIGNED, with reduces set-up,
special engineered loading, and
clamping and operating time
— does a preAmerican (above), cision job at a
finishes radius production
and cuts teeth
with a single pass

BROACHING

BROACHING IS BETTER
THE American WAY

BY SPEEDILY CONVERTING part of its plant to the manufacture of guns and other munitions, rubber eminently deserves credit as one of the production lines behind the firing lines. Noteworthy is the industry's recognition of broaching as a better way to do many metal-working jobs—the only right way to do some!

TEETH IN GUNNER'S QUAD-RANT (left) are one of the forms which only broaching can do with the speed and precision required.

American

BROACH AND

MACHINE CO.

ANN ARBOR, MICHIGAN

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY



of the tool.

# For greatest production from Carbide Tools



In addition to the proper handling of carbida tools on boring, turning, and facing operations, it is necessary to choose the correct grade of EENNA-METAL for the specific job to get the greatest possible production.

Check the grade on the tool shank; this grade marking appears on all KENNAMETAL tools. If the tools are being made in your own plant, have the tool maker indicate tip grade on all shanks.

Using the wrong tool grade may mean unnecessary tip wear, a broken tool, or less than capacity production. To be sure the grade is correct for the job, consult your Vest Pocket Manual, or KENNA-METAL Catalog No. 43.

RENNAMETAL is made in four standard grades of hardness.

USE GRADE EM for the majority of jobs where a strong, durable tip is required, as in machining alloy steels and carbon steels above .35 carbon, of hardnesses up to 550 Brinell. USE GRADES KH and K3H on scale-free, continuous cuts or where material being machined is very soft, as in SAE 1020, or free machining steels. On extremely hard steels (above 400 Brinall) it is advisable to use KH or K3H for resistance to edge

USE GRADE K3H or K4H on precision bering or on continuous cuts where extreme wear resistance is necessary; use only K4H on non-farrous metals, such as brass, bronze and light alloys.

Characteristics of the Four Grades of KENNAMETAL

Grade	Reclosell A	Rashwall	Strength Transverse Rupture Lbs./Sq.in.	Thermal Conductivity esl./9C. cm./sec.
KM	90.8	77.6	305,000	.113
KH	91.3	78.6	275,000	.074
K4H	92.5	80.6	225,000	.110

Write for your copies of the Vest Pocket Manual and the new McKenna Catalog No. 43.

\* INVENTED AND MANUFACTURED IN U. S. A.





# U.S. Multi MILLERS

### deliver Plus Performance in War Production

THIS is one machine tool which efficiently performs a number of operations on comparatively small parts and consequently can be applied to great advantage in war production. Its cam controlled action makes it an extremely versatile and time saving tool. The table feed cam illustrated - detail at the right - is the basis for close accuracy, especially in taking blind cuts . . . for short set-up time without guess-work . . . for a fast approach, a cut at the most appropriate predetermined speed, and a fast return ... for conserving skilled labor, as the automatic table cycle enables one operator to handle a full battery of these machines. A cam applied to the vertical motion of the spindle head can easily he synchronised with the table feed cam for two-level milling, angle cuts, contour cuts, etc. A few of U. S. Tool Cam-advantages are pictured in detail-all enhance the performances of the U. S. MULTI - MILLER which include index milling, speed grinding, vertical milling, spur gear cutting, hand milling, automatic cut off, continuous milling of bar or coil stock, climb milling, rotary milling, contour milling-all are "Plus Performance" features, ideal for War Production. Revised Bulletin lists all U.S. MULTI-MILLER advantages; send for your copy today.





U.S. TOOL COMPANY, Inc.
AMPERE (East Orange), N. J.





Standard Cam provides cycles of fast table approach, cuts at desired speeds and a fast return. Top view illustrates special double cam for positive return stroke of table. Table traverse is always smooth-actioned. No backlash, ever! Center view illustrates application of special hinged fixture which, in conjunction with cam-operated feeds, mills intricate contours at high speeds, with absolute accuracy and smoothness.





FORGED MOVEABLE JAW"

This time tested "Four-Point" Milling Vise has performed most Milling Vise has Performed most successfully for manufacturing years in large in lar

plants producing interchangeable parts
It is designed take
constructed to take feeds and
the present day milling maspeeds of modern milling particularly
chines plants producing in. speeds of modern milling machines it is pass milling.

adaptable to small arms milling. ausplanter to small arms millings

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cannot alloyd the time and cost of a slow operating vise. Speed of a slow operating visal. is essential, in fact vital. THE VISE WITH THE ONE PIECE SOLID Super Spacer The Super Spacer, with its attach-ments and fixtures has grown The puper phacer, with his proven

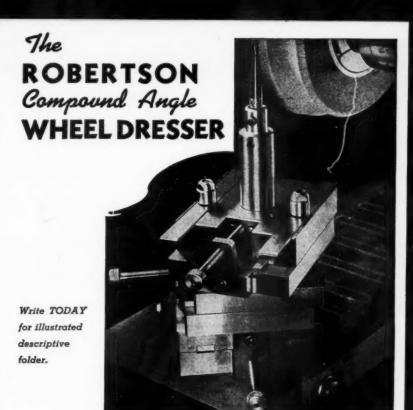
ments and uxtures, ness travelle to be a tool of exceptional value for the rigid control of accurate in the rigid control of the rig for the rigid control of accurate It is machining operations. Drilling machining for Milling, and imited adaptable if Boring and imited ting, at feeds and speeds the holding means and the power of the machine.



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THE HARTFORD SPECIAL MACHINERY CO.

HARTFORD CONNECTICUT.



### saves precious man-hours in production

This precision instrument is playing a vital, important part in America's all-out war effort . . . . speeding-up production, by saving both time and money.

With the Robertson Compound-angle Wheel Dresser, a machine operator can dress an included angle tangent-to-radius from 0° up to and including 180° at one setting, thus eliminating the old method of "trial and error" dressing.

# F.H.ROBERTSON CO.

# 3 Inch Hy-Duty Shape-Kite Shaper

Modern war production requires precision machine tools. Shape-Rite Shapers meet all precision requirements in defense work. Before you purchase a shaper for your needs, investigate the specifications of the Shape-Rite Shaper. See your dealer or write us for further information.





# Up Goes Production Down Comes cost

A Husky but Sensitive Hopper Feed Screwdriver which drives small screws

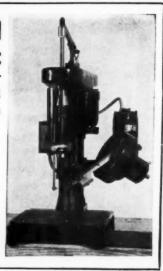
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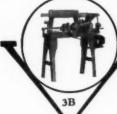


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Capacity at 45 degrees,
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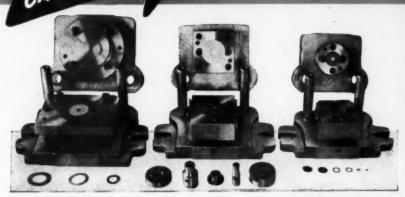
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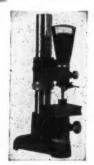
# WE MUST HAVE GAGE BLOCKS TO WIN THIS WAR!

### WHAT ARE GAGE BLOCKS?

Except for the men who use them, few people know what Gage Blocks are. Briefly, they are small pieces of special steel accurate to a few millionths of an inch. These blocks are the basis of all precision measurements, furnishing the standard or pattern from which measurements used in manufacturing processes are taken. A simple illustration is this comparator being set against gage blocks. The comparator will then



be used to check precision aircraft parts in production.



#### WHY ARE GAGE BLOCKS SO VITAL TO WAR PRODUCTION!

Mass production of war goods is made possible through development of the system of interchangeable manufacture. This term simply means that parts to be assembled into a complete unit—engine—gun—torpedo, etc., etc., can be manufactured with such uniform accuracy that any part can be interchanged with any other and the unit assembled from any group of parts without first selecting them to fit together.

To achieve this uniform accuracy of parts some constant unit of measure to serve as the basis of all precision measurements had to be found. The answer is gage blocks.

The entire system of interchangeable manufacture which alone makes possible our mass production of tanks, planes, guns, shells, ships, etc., etc., would not exist today—if it weren't for gage blocks.

We just wouldn't have any "War Production" if these little pieces of steel didn't exist.

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Gage Blocks were introduced into the U. S. about 30 years ago. Since then only three outstanding manufacturers of this unique product have arisen

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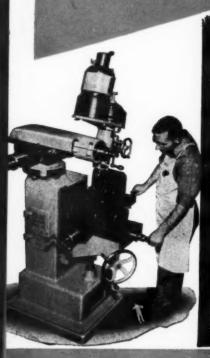


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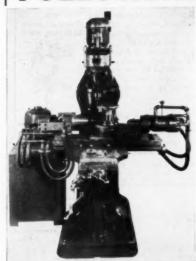
Heads, and Fray "All-Angle" Milling Attachments

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## Featured In This Issue

NOVEL FIXTURE SPEEDS DRILLING—From 24 to 32 hours per week are said to be saved thru use of a new fixture in the drilling of marine gear casings at one of General Electric's major works. This novel universal indexing trunnion fixture permits positioning the massive casings for drilling at any angle in a full circle and at any plane. In other words, it allows rotation of the work in a combined merry-go-round and ferris wheel manner and dispenses with the use of a crane for positioning. See page 121

QUALITY CONTROL is the theme of Edmund Mottershead's fourth contribution to the Foremanship Forum. Mr. Mottershead explains the need for quality control and the requisite factors in sustaining quality. The specific problems of a number of plants are given, along with comments and recommendations, in the section beginning on page....143

THE BOOK CORNER, conducted by M. H. Kauer, presents condensed reviews of recent worthwhile books, beginning on page ......191

MACHINES OF THE YEAR—A review of many of the machines presented during the year, with brief descriptions, names and addresses of the makers together with a reference index, commencing on page......203

ANNUAL BUYERS' DIRECTORY starts on page ......417

### HOW TO GET THE MOST OUT OF YOUR LATHES

No. 4 in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient war production

### Keep Your Lathes in Trim

The old proverb, "An ounce of prevention is worth a pound of cure", is as applicable today as ever. Lathes must be "kept in trim" if they are to give long, trouble-free service. Although the adjustments required to "keep the lathe in trim" are relatively simple and few, they are important and should not be neglected.

#### **Power Transmission**

Maximum efficiency and production depends on the ef-

fective transmission of power to the lathe spindle. The lathe motor should always develop its full rated power and operate at a uniform speed.

All belts must be properly adjusted. If the belts are too loose they will slip, and if they are too tight they will cause loss of power through friction. The belts should be just tight enough to transmit the required power without slipping.

#### Davatali Sildes

When the adjustment of the dovetail gibs is neglected, looseness of the slides may cause the tool to chatter or may result in inaccurate work. The gibs should be tight enough to assure the necessary rigidity, but not tight enough to bind and make the dovetail slides hard to operate.

#### Tailstock Adjustment

The alignment of the tailstock top



Adjust the dovetail gibs to insure accurate work

should be checked frequently as any misalignment will cause the lathe to turn a taper. Test this alignment by turning and measuring diameters on a test bar. Correct the alignment by turning the tailstock top set-over screws.

#### Don't Abuse the Lathe

Don't expect the lathe to stand abuse. Never use the lathe bed as an anvil or straighten shafts between centers. Never rap a file against the lathe bed or tailstock.

#### Write for Bulletin H 4

Bulletin H4 giving more detailed information on keeping the lathe in trim will be supplied on request. Also re-prints of this and other\* advertisements and bulletins in this series. State quantity wanted.

- \*H1, "Keep Your Lathe Clean"
  H2, "Oiling the Lathe"
  H3, "Installation and Leveling of the Lathe"



### SOUTH BEND LATHE WORKS

South Bend, Ind., U. S. A.

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# as The Editor Sees It



EVERY loyal American is pulling for an All-Out Allied Victory . . . in '43 if possible.

Here are some suggested good resolutions that

will help speed the day

Time is still a vital factor. If each and every one of us can save just a few minutes each day . . . and devote them to increasing war production, they will amount up in the aggregate and help shorten the struggle and save the lives of some our boys. Resolve to make every minute count!

Some of the necessary wartime restraints are bound to be irksome. Let's try to be good sports about rationing and regulations. We may have to forego some of our accustomed luxuries . . . but all of us over here are eating regularly . . . and

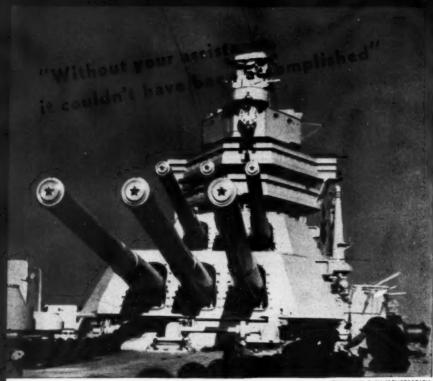
a little self-discipline will do us no harm.

The steel mills need more scrap. We may see huge piles in storage yards, but WPB has already inventoried them . . . and the total is still far short of requirements for our tremendous production. There is an emergency call for dormant scrap in the plants and in the homes. Let's apply the WPB formula . . . if anything made of steel or other strategic material hasn't been used for three months . . . and if nobody can prove that it will be used within another three months, Uncle Sam needs it.

Then there's the matter of War Savings Bonds and Stamps. The costs of global warfare are terrific. The Government needs our spare Dollars . . . and

there's no better investment.

Wesley G. Paulson



OFFICIAL U. S. NAVY PHOTOGRAPH

Record-breaking service on an important Navy order, made possible by Ryerson cooperation on steel! "Without your assistance, it could not have been accomplished," writes the contractor — and again Ryerson teamwork scores.

Cases like this — in which quick Ryerson steel-service has speeded up war production—run into the thousands! While we have not kept count, enough Ryerson customers are working on war contracts to firmly establish Ryerson steel from stock as a vital part of the war production machine.

Hundreds of plants on war contracts are depending on Ryerson for steel. An important order here, too urgent to wait on mill production; a few bars there; some strip or a few sheets somewhere else. It multiplies into tremendous tonnage—all labeled "RUSH"—and it's all going into tanks, planes, guns and ships to beat the Axis!

It is a source of pride to the Ryerson organization that its One Hundredth Year finds it on the direct line of greatest service in the war production program —There is a great deal of satisfaction in a War Production Unit report: "Without your assistance it could not have been accomplished."

JOSEPH T. RYERSON & SON, INC. - Chicago - Milwaukee St. Louis - Cincinnati - Detroit - Cleveland - Buffale Besten - Philadelphia - Jersey City

RYERSON STEEL-SERVICE

# Plastic Mold Making

# For Aircraft Ignition Parts

By H. A. FROMMELT\*

THE power plant of modern aircraft is sparked by a magneto whose dependable operation is largely responsible for its almost incredible achievements. Into this generator of high tension electric current must go the finest selection and design of materials as well as the most skilled workmanship. This is obvious, even to a casual visitor to the Scintilla Magneto plant, a division of the Bendix Aviation Corp. Here, in a sparkling plant that is thoroly modern, thousands of mechanics in the best tradition of craftsmanship produce magnetos that are helping to send

PAGE CONTILLA SCINTILLA MERO

Fig. 1—A typical high tension magneto as used in airplane ignition systems.

American aircraft to new heights of achievement in our war effort.

Specially designed and skillfully processed plastic materials are indispensable to the modern aircraft magneto. There is here no question of substitutes. These materials are chosen for their own superior inherent qualities and characteristics. A special rubber plastic composition and Bakelite are used in the magneto and distributor parts around which the present discussion centers. The processing, specifically of the distributor blocks, cylinder distributor, the coil housing, the coil cap and terminal block, including the mold making and plastic casting of these parts, will be discussed hereafter.

Other essential elements of the modern airplane ignition system, including the distributor head will be considered later—at least so far as their plastic mold and casting operations are concerned. Together these make up the heart of the ignition system, the operation of which will now briefly be discussed for a better understanding of the important part plastics are playing in aircraft development.

#### The Airplane Magneto

Essentially, the magneto is a generator of alternating current. Its rotating magnet has 4 poles of alternate polar-

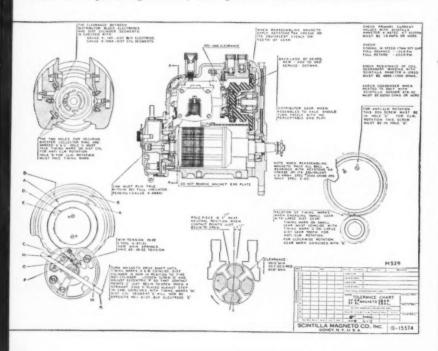
(\*Director of Industrial Research, Kearney & Trecker Corp., Milwaukee.) ity. Each time the magnet rotates thru a quarter turn, the polarity changes and causes the magnetic flux to flow in the opposite direction thru the core of the coil. This reversing flux causes an alternating current to flow in the primary winding.

Energy is stored in the magnetic circuit when the current flows in the primary winding. The contact points are in series with the primary winding. When maximum energy has been stored in the magnetic circuit, the cam lifts the cam follower which in turn separates the contact points. This breaks the primary circuit and causes a rapid change of flux in the magnetic circuit. This flux links the secondary winding, which has many turns of fine wire. The rapid change of flux, due

to the opening of the contact points, produces the high tension spark at the spark plug.

Schematic diagrams of electric and magnetic circuits are presented in Fig. 2 and 2A. One end of the primary winding is connected to the ground; the other takes an insulated path thru contact points and then back to the ground. The condenser is connected across, or in parallel with the contact points, and absorbs the current produced by the self-inductance of the primary circuit during the time the contact points are open, thereby preventing current from arcing across the points which would cause them to burn and pit.

One end of the secondary winding is grounded and the other end terminates



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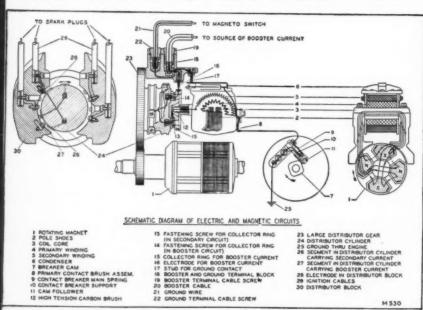
at the high tension carbon brush. The high tension spark goes from the high tension carbon brush to the centrally located segment in the booster collector ring. From there, it is conducted thru one of the screws which hold the booster collector ring and then to the high tension segment on the distributor cylinder. The spark then jumps to the distributor block electrodes and thru the spark plugs back to the ground.

The booster current comes thru the booster cable, which is connected to the booster terminal marked "H". From there, the current goes to the booster electrode, booster collector ring, and thru one screw which secures the booster collector ring. It then is conducted to the booster segment in the distributor cylinder and across to the distributor block electrodes and spark

plugs. The booster segment in the distributor cylinder trails the high tension segment and consequently gives a retarded spark. In other words, when the high tension segment is in position to fire No. 1 cylinder, the booster segment is in position to fire No. 9 cylinder.

The cable from the magneto switch is connected to the terminal marked "P" which is connected to the ground contact stud and the primary bridge of the coil. When the switch is in the "OFF" position, the primary circuit is short-circuited before current can pass thru the contact points.

With this brief description, illustrated with the schematic diagram in Fig. 2, the part played by the distributor cylinder (No. 24) is evident. Its material when molded, must show the highest dielectric characteristics in order to





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bed. But, when the press is inadvertently overloaded, the safety bed is forced down a sufficient distance to permit the normal stroke of the press to be completed safely and harmlessly.

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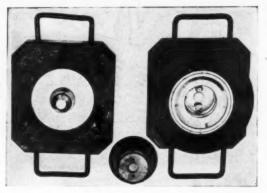


Fig. 3—Mold used for casting of the distributor cylinder shown.

meet the exacting requirements of an aircraft magneto. This piece, as molded of a special plastic rubber composition which alone meets these requirements, is shown in Fig. 3 between the 2 parts of its hand-operated mold.

#### Distributor Cylinder Mold

Scintilla uses the rotary head tool and die miller for its highly skilled and rigidly specified mold processing. The rotary head of this machine, clearly visible in Fig. 4, can be rotated either by hand or power. At the same time the spindle, an integral part of this head, is capable not only of a rotation separate from that of the head, but it can be offset so that its center

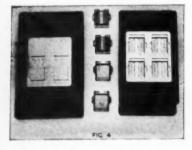


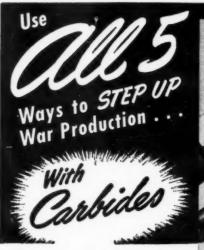
Fig. 4—Mold for the condenser covers, as shown between the 2 mold sections.

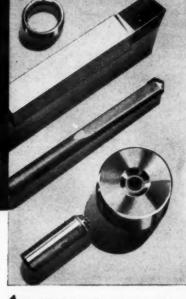
can be shifted a maximum of 4" from center of the head. Thus, just as a compass is set to scribe a circle, so the spindle can be offset to mill a circular cavity.

The mold shown in Fig. 3, which is used for casting of the distributor cylinder, is milled at a real economy of time thru benefit of the rotary head principle. After center of the spindle and center of the workpiece are made to coincide, it is only necessary to offset the spindle an amount equal to the radius of the cavity less the radius of the cutter and less finishing stock. No measurements are necessary, all settings being made finally with micrometer dials attached to the various movements of the machine. Using this operation method, obviously both the well and the force of this mold can be milled as shown.

#### Mold for the Distributor Block

The distributor block (See No. 30, Fig. 2) as is obvious from Fig. 1 and the schematic diagram, Fig. 2, is the necessary complement of the distributor cylinder and plays, therefore, an equally important part. The finished casting, as well as the interesting mold set-up are shown in Fig. 5. The cores that form the outlets to the spark plugs





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🗣 Draw Metals Batter! . . . Draw, size, extrude your metals through carbide dies for better finish, greater accuracy, larger output, more continuous operation. Use for wire, bar, tubing, sheet metal. Outstanding for cartridge cases from .30 cal. through 105 mm, (Manual D-113.)

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are mounted on the vertical block, and as shown, are ready for insertion in the mold. The die block or workpiece to be milled is mounted on the table of the rotary head tool and die miller with the flat side (see Fig. 5) on the table so that the circular cavity can be milled into the vertical side of the block. Again the spindle is offset an amount equal to the radius of the cavity shown, less the radius of the cutter and stock for finishing. The cavity for the rib as shown is milled with a form tool similar to that of a tee cutter formed to the shape of the rib as designed in this distributor block. The remaining portions of the cylindrical face are milled with an end mill.

and satisfactorily performed on the rotary head tool and die miller.

The central cavity as shown is milled by offsetting the spindle as previously explained. The cylindrical extensions appearing on the end of each half of the mold and casting are formed in the die block with an end mill. For the latter operation it is necessary to change the set-up of the workpiece in order to mill this cavity.

#### Coil Cap Mold

The coil cap casting, again of special composition plastic rubber, along with its mold, is presented in Fig. 7. 'The requirements of this part of the equip-

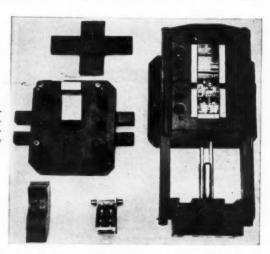


Fig. 5—A finished distributor block, and the interesting mold set-up required for its production are here shown.

The inserts are shown in place in the mold, just prior to the loading and molding operations. Here again a plastic rubber of special composition is used largely because of the high dielectric requirements in the specifications.

The mold for the coil housing is shown in Fig. 6 as well as the completed casting. The necessary mold making operations are economically ment demand a material of high dielectric strength.

The mold is simply milled with notable economy in time on the rotary head machine. In one setting of the workpiece on the table, the cavities, as shown, can be milled without measurements or change of setup.

Terminal Block Mold and Casting

The terminal block mold and casting

# Im fellin'lou

No. 5 in a Series of Tipe on "Keeping 'em Turning" by John Stephene, 41 years at LeBland

One of the most common causes of trouble in lathe work is a dull or inaproperly ground tool. I'd like to illustrate a few of the correct steps for giving first aid to "beat up" tools. The best method is the semi-automatic grinding machine.

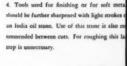
If your tool room has one, let the expert in charge do your grinding. But if you do your own grinding by the offhand method, watch these points.



The rool is supported on the work rest at moved with a rocketing motion over the face the entire grinding wheel. This prevents the to from turning and distributes wear on the whee

 To cut free a tool must be ground with four correct angles—side clearance (top drawing) and back rake, side rake, and end clearance (shown on bottom drawing). These angles

on bottom drawing). These angles as well as the shape of the tool vary with the material to be machined. Refer to a tool manufacturer's manual.





The most satisfactory way to grind a tool bit is in its own holder. To prevent grinding the holder, extend the tool beyond its regular cutting position.



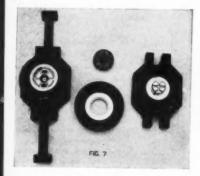


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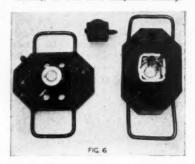
are shown in Fig. 8. This part of the airplane magneto must obviously meet the most rigid requirements and, hence, plastic rubber of special composition, is again specified.

The multiple cavity mold is, in reality, composed of separate molds held in the frame as shown. The cavities in this mold require milling the horizontal planes only on the rotary head tool and die miller, from an examination of the illustration as will be obvious.



Attention should be called to the multiple origination method at this point

Fig. 6—Here is the mold for the coil housing, as well as a completed casting.

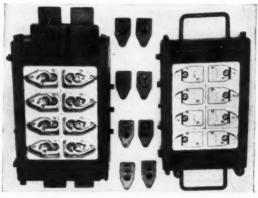


since it can be profitably employed in the milling of a multiple cavity mold such as shown in Fig. 8. One reference will suffice to clarify this interesting "short cut". For the milling of the circular pointed nose of this terminal block, the spindle is offset after the center of the rotary head is made to coincide with the center of this arc. The amount of the offset is equal to the radius of the arc, less the radius of the tool, less stock for finishing.

After the first nose or arc has been milled, the table can be moved transversely to the corresponding position



Fig. 8 (Right) reveals the terminal block mold and typical castings.



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for the second "nose". And so for the 4 positions corresponding to the 4 "noses". After the fourth has been milled on one side, the table is moved longitudinally until the center of the head coincides with the center of the first arc in the second row of molds. The transverse table movements will again bring the cutter into position for the milling of each successive nose in the second column.

This so-called multiple orgination method that is used for all the other contours of this mold is an instance of the time-saving short cuts possible with the rotary head machine.

#### **Molding Operations**

The magneto parts mentioned in this discussion, and as will be obvious from the illustrations of the molds themselves, are hand-molded. (See Fig. 9). There is no justification from a timesaving standpoint for any other meth-



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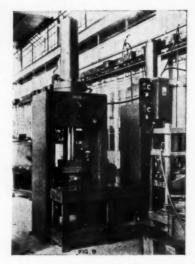


Fig. 9—Hydraulic press of the type used in molding high tension magneto parts.

od. The curing time in the mold varies, as will be appreciated with the size and character of the piece. For the purposes of this article it can be assumed as a cycle averaging approximately 10 to 12 minutes. Obviously, while the material is thus curing in one mold, another can be loaded and prepared in the hand-operated molds as shown.

The requirements of these magneto plastic parts is such that the cast parts are heated to a temperature averaging 300 F and for a period of approximately 36 hours.

The remaining essential parts of this Magneto will be discussed in a subsequent article. Also, a presentation of the very interesting modern distributor head, separate and distinct from the magneto will be considered as a plastic mold and molding operation.

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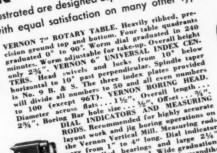
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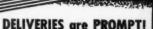


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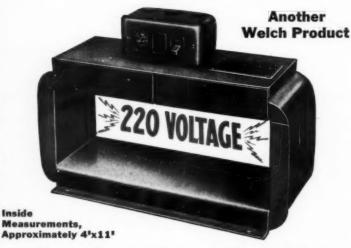




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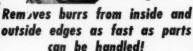
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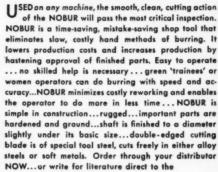




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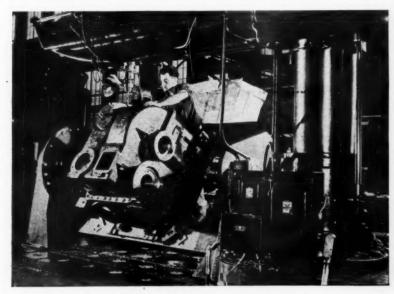
FROM 24 to 32 hours per week are being saved with a device developed to speed the drilling of marine gear casings at one of General Electric's major Works.

The device, a universal indexing trunnion fixture, permits positioning the casings for drilling at any angle in a full circle and at any plane. In other words, it allows rotation of the work in the manner of both the merrygo-round and the Ferris wheel.

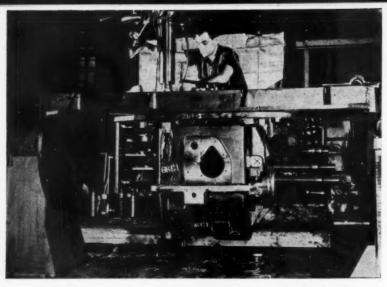
About 110 holes must be dri'led, tapped, or spot-faced in each of the casings, which vary in weight from 1000 to 2000 pounds. Before the trun-

nion fixture was developed, a crane had to be summoned to reposition the casing after each surface was drilled. This meant that each piece of work had to be set up at least 6 times.

Now, work is set up just once on a table which can be turned completely around in either direction with no more effort than is needed to push a revolving door. With the table locked in the desired position, the casing can be electrically rotated end-over-end to expose any portion of its sides or bottom to the drill. This movement is controlled by push button, and rotation in either direction thru a 360-degree circle is possible.



Operator drilling a casing tilted at a 45-degree angle.

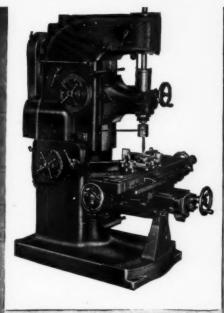


Fixture in the upside-down position with operator drilling bottom of the casing. The driven trunnion and the indexing plate  ${f are}$  at the left.



Frame perpendicular to the floor, showing bottom of the table and lever which raises it for turning.

FIVE OPERATIONS AT ONE SETTING



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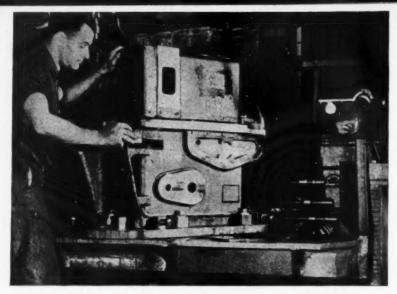
For All-Out War Production, Maximum Speed, and a round 24 hour operation your best bet is the NO. 40 KNIGHT MILLER. It is a universal vertical unit that combines the maximum amount of versatility, rigidity, accuracy and speed without sacrificing any one quality for another.

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The table is mounted on a frame suspended on 2 horizontal pivots, or trunnions. One of the trunnions is chaindrive thru a worm-gear arrangement, by a ¾-hp geared motor. A circular indexing plate with 18 holes around its periphery is mounted on the driving side for quick selection of any of the various angles called for by the specifications. A stud is used to lock the fixture at the desired angle.

For lateral rotation, the table must be in the flat position with the work right side up. The clamping bolts at the 4 corners of the table are removed, and, by turning a lever underneath the fixture, the operator raises the revolving table just enough to clear the frame. The table can then be turned easily by hand and relocked in any position.

The table also serves as a drill jig for the base of the casing, eliminating the need for layout and assuring accuracy.



(Photos—Courtesy General Electric Co., Schenectady, N. Y.)



◆ In this day of urgent manpower need, we must not overlook the "pirates" within our own plants that cut down manpower. Improperly designed machines, need for new tooling, bad plant layout, inadequate production control systems, are but a few of the common manpower pirates that can keep you from achieving your greatest possible production efficiency.

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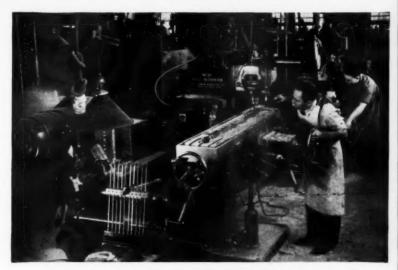
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Both hand and universal types of milling machines, such as these Van Norman's, are used for the surfacing and slotting operations at Synthane.

#### By G. A. EBELHARE\*

O successfully turn, bore, drill or mill laminated Bakelite, the keynote is speed, speed and more speed. Surface speeds as high as 4,000 feet per minute for boring and turning—13,000 feet per minute for sawing—1,500 feet for drilling—are being used to fabricate rapidly and accurately, the thousand and one different items demanded today by our Armed Forces.

This speed however, is not always available in standard machine tools and it has been necessary to have machines altered, increased in size, re-motored and changed in many ways to meet the requirements. It must be understood that machine tools are designed and built primarily for the fabrication of metals and are therefore built in the proper proportions to withstand pressures and strains resulting from heavy cuts. A standard machine tool, for example a 14-inch lathe, is heavy enough to handle laminated plastics of a size, that would require in metalworking, an 18 or 20-inch lathe. But this same 14-inch lathe, while heavy

<sup>\*</sup>Supt., Synthane Corp., Oaks, Pa.

Surface speeds of 4000 fpm are attained with lathes such as this LeBlond, Many types and sizes of lathes are essential for economical, precision turning.



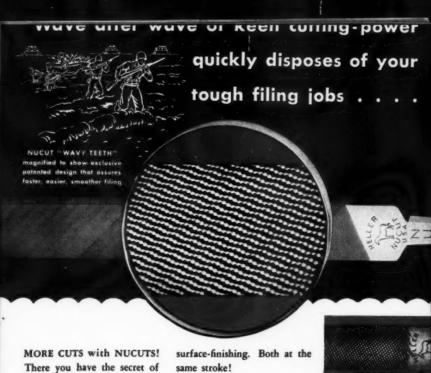
enough for extremely large laminated jobs, does not have the spindle capacity or the speed required. These difficulties were overcome by having oversize hollow spindles installed and by increasing the speed and horsepower



Circular sawing is one of the most important operations in the machining of Synthane. Sheets, rods and tubes are circular-sawed. Work handled varies in size from the smallest parts up to 24 inch tubes like this. of the driving motors. In many cases, we have increased the manufacturer's recommended speed as much as 100% without any damage to the machine tool, proving that modern machine tools have a high safety factor and that most manufacturers are very conservative in their recommendations.

We have standardized on a production lathe which meets the requirements, built by the R. K. LeBlond Machine Tool Co. This machine has a 4speed motor in the head, with a top speed of 3,600 rpm, A 41/2-inch diameter can be turned at this speed, using tungsten carbide, tooling, and an operating speed of about 4000 surface feet per minute. At this speed and using a feed of .005-inch per rpm, 18 inches can be turned per minute with a polished finish. Feeds as high as .015-inch per minute are possible, resulting in slightly rougher finished surface. Boring is accomplished at the same speeds and feeds with similar results.

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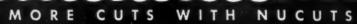
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proved heavy enough and had the proper speed to handle 3-inch diameters. Therefore an oversized head was designed and built to receive 3-inch draw-in collets. This relatively light weight turret lathe has been operat-



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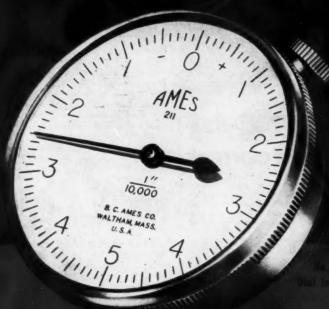
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I believe all records for speed are broken in the sawing of laminated Bakelite. A surface speed of 13,000 feet per minute is attained with the use of a 14-inch diameter circular saw, running 3,600 rpm, Solid carbon steel blades, without set but for some classes of work hollow ground. are used in most cases. However, for extremely hard laminated with either a graphite or asbestos base, it is advisable to use blades tipped with tungsten carbide. The secret of this high speed sawing rests in the constant sharpening of the saw blade. The life per grind, of course, depends upon the thickness and grade of material being cut. For some classes of sawing, the blades are changed as often as every 15 minutes.

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# CONTINUE ACCURATE HIGH PRO- 943



TVPE S Automatic Hobbing Machine — For production of small problem gener up to 1' diameter 5 M' free and 500 D P.



St. 3 Standard Hobbing Machin

— Capacity: I' dis. 2 7' face. 1

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Frankann Tree.



So. 2 Automatic Hob Sharpening Mashine for hole and formed outlers. Capacity up to 4" dia. 2

To WIN a war takes a lot of work, and a lot of tools to work with.

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For example, Barber-Colman Type "S" Hobbing Machines are hobbing tiny gears for control instrument mechanisms; our No. 3 is cutting precision gears for synchronizing devices; the Type "A" produces gears for aircraft engines; the Type "T" is hobbing Taper Splines for better power transmission; and the Type "D" is hobbing transmission gears for hardhitting tanks.

B-C Automatic Sharpening Machines are making it possible for Hobs and Cutters to perform more efficiently in operations vital to victory, through proper sharpening with controlled accuracy. The Combination Sharpening Machine, in addition to handling a variety of Hob, Cutter and Reamer sharpening problems, has contributed a new method for sharpening Tapered Chambering Reamers, guaranteeing uniform performance.

B-C Hobs, Milling Cutters and Reamers are performing efficiently on thousands of manufacturing operations where dependable performance is vital to victory. . . . . . their inherent attributes doing important parts in the tremendous job of Winning the War. These same attributes will faser do their part in Keeping the Peace.

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work within its capacity. Spur and spiral
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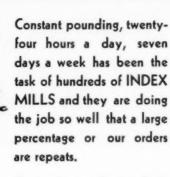
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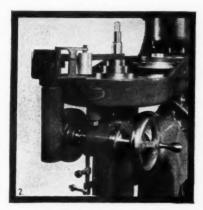
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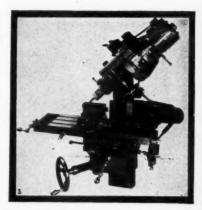
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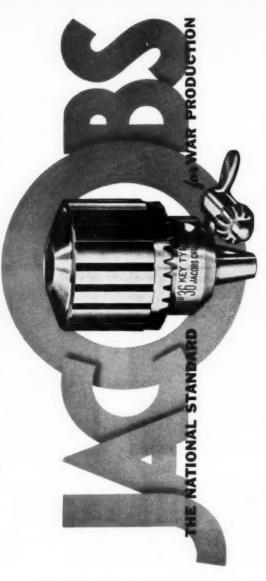
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January 1943

MACHINE TOOL BLUE BOOK

141

accuracy, the speed for Victory production. Experience proves that "if it's a Jacobs . . . it holds!" Applied to virtually every type of tool-holding operation, the Jacobs Chucks delivers the convenience, of



Hartford, Conn. The Jacobs Manufacturing Co.,

#### The Foremanship Forum

#### By EDMUND MOTTERSHEAD

Part IV-Quality Control

THE effectiveness of the average foreman is usually measured by 3 very important and definite standards:—his contribution to improving the quality of the product, to reducing the cost of the product, and the ability he exhibits in maintaining manufacturing schedules in his department. Any activity on the part of the foreman which does not result in the attainment, either directly or indirectly of one of these ends may be counted as time and effort misdirected and lost.

Control of quality involves the establishment and maintenance of proper standards of material and workmanship as they appear in the finished product. Obviously, manufacturing operations can succeed only so long as they produce a saleable article, one which is consistently acceptable to the public. While many factors go to make up the saleability of a product, most of them may be lumped together and called the "consumer value" or the value of the product from the consumer's point of view. This value from the consumer's point of view may be one of usefulness, of workmanship over and above that required for regular use, of them, or place. The same goods delivered 2 weeks too late may have little or no value compared to what they would have had if delivered on

Today, most manufactured articles are sold in competition with similar products; therefore the consumer's choice is made as a result of comparative values (excluding for the moment the power of advertising and sales promotion methods). A comparison of values insofar as the typical customer is concerned involves the consideration of 2 principle factors—quality and cost. Obviously, the manufacturer who can produce and sell an article of equivalent or superior quality at the same or a lower price than competitive products will command the consumer's market.

In the final analysis, the customer controls quality by his decisions to buy or not to buy. When it has been determined what the customer expects or insists upon in quality, then the manufacturing department must translate those demands into standards of production and see that those standards are maintained.

The inspection foreman in a shop manufacturing small parts has a problem:—"I am trying to sell the management of this company on a campaign to increase the quality of workmanship here, reduce scrap and rework, and lighten the load of the inspection department a bit. Could you give me a rough outline of some of the factors which have an effect upon quality and some of the detrimental results of a lack of proper quality control before the parts get to us?"



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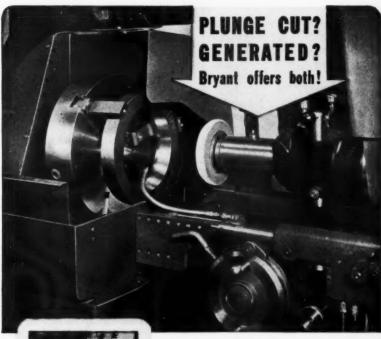
2634 Fullerton Ave. Chicago, III.

Quality results from design and workmanship. Naturally, we are concerned especially with the workmanship phase of the subject; but under modern industrial methods we must consider both. The designer determines not only the general working relationships of the parts of the product, their general form and structure and material, but he must also determine and transmit to the shop the most detailed specifications as to form, composition, dimensions, performance and physical characteristics. The quality intended by the designer cannot be embodied in the final product unless the shop religiously adheres to the specifications which he has established.

Your problem is to get the rest of the organization to carry out that burden so that while you perform your function of inspection, there are fewer rejects and consequently less "heat" is turned in your direction by everybody else.

In any sales effort the first problem is to convince the prospect of the fact that he needs what you have to offer. In selling an idea, you have to convince the others in your organization that they really need to do what you have in mind. Now, what are the reasons why they should pay more attention to workmanship? What are the evil effects of neglecting to control the quality of their work so that it will conform to the specifications of the designer?

In the first place, lost sales, if you are forced to pass inferior work. John Public finds out very fast about a product which is not up to the competitive standards in performance and usefulness of similar products on the market in the same price range. Decreased volume of sales means less work in the shop and may lead eventually to lay-offs or at least to the discharge of the less competent and less necessary workers. Let them think





View showing formed guide attached to subset dide own on No. 16 Bryant Grinder



No. 16-99' Bryant Internal Grinder

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A guide is used for controlling the wheel slide traverse to follow the work contour or for controlling the shape of the wheel if the plunge cut method of grinding is preferred.

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that over. The bad reputation which the product gets on the market also means that potential sales are lost. The sales and advertising departments already have trouble enough combating rumors about hidden weaknesses of your product without there actually being any. Customers who resent imperfect goods sufficiently not only will demand replacements, which money, but will probably discredit you up and down the street to all their friends. If replacements are necessary, your service department will run it's legs off and wear out whatever kind heart it has trying to keep the customers happy when they should have been satisfied in the first place with a satisfactory product, People of course never like to have rejects come back at them, and this natural reluctance to admit their own mistakes makes for buck passing. Enough buck passing in a plant will go a long way to disrupt the works. Some companies have wage plans under which rework is done without compensation and the workers have to pay for the scrap they cause. This direct cost to employees if enforced sufficiently should help improve quality generally.

Generally, too, neglecting to control quality is simply a reflection of poor shop discipline all around. Shop morale is lowered. The workers fail to take the right amount of pride in their work. There is a feeling of indifference about the whole thing among the workers as well as the supervisors in the plant, which also shows up in poor supervision over other elements of production than quality control. Along with this comes a higher frequency of accidents and injuries to the workers, resulting in costs to the company of compensation, medical and legal expense, lost time, replacing the workers. time of other workers, etc., and cost to the injured men in health, earning capacity, time, wages, and security. If



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CAPACITY: Pump, 1000 G.P.H. Tank, 40 Gals. Size, 16x16x36 in.

PUMP: Centrifugal;

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NOW you can have large coolant-vol-ume and high flushing capacity in a Portable Coolant System. Wherever you want the advantages of using coolants you can have them - on all your equipment-for all metal working operations like: grinding, honing, milling, cutting, tapping and threading.

The new Gray-Mills Hi-Volume Centrifugal pump, scientifically designed, specifically to handle coolants, will easily deliver 1,000 gal. per hour, or a controlled flow of any volume down to 10

gal. per hour. Here are some other important features:-A relief valve eliminates pressure build-up-The tank is fitted with baffle plates, for forced settling of abrasives and chips, to keep the coolant clean-Rugged, simple construction assures long trouble-free service - Horsepower consumption is low because efficiency is high.

Write for complete details on the New Hi-Volume Centrifugal and learn how easily you can use it wherever you need

large volume coolant flow.

If any of your production equipment is handicapped in not being able to handle coolants, the answer is a Gray-Mills Portable Coolant System. In addition to the Hi-Volume Centrifugal of 1,000 gal. per hour capacity there are other coolant system models with capacities from 50 to 165 gal. per hour. We have the answer to your coolant system problems!

#### OTHER MODEL



75 to G.P.H.



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Maximum production is a patriotically. If you use magnetic chucks, you can step-up production through the use of NEU-T-ROL—which can be installed easily on existing equipment—or built into new machines if you just specify NEU-T-ROL.

NEU - T - ROL releases the work promptly from the magnetic chuck and demagnetizes it as it releases it. There's no need for tugging, hammering or prying. NEU-T-ROL saves time, saves chuck faces, saves chance of operator injuries and saves warped, bent or broken work pieces.

NEU-T-ROL is easily installed on surface grinders now in service—or manufacturers will build them into your new surface grinders if you just specify "NEU - T - ROL". Bulletin No. 21 gives full information.



Two Types: Motor Controlled for Remote Control-and Manual Controlled for small units. "There's a Neu-T-Rol for every size of chuck."

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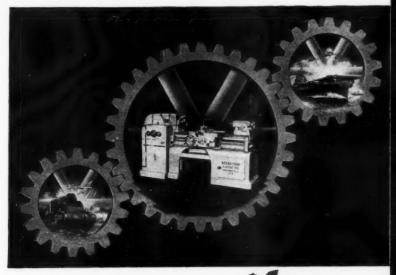
Electro-Matic Products Co. 2235-37 North Knox Ave., Chicago, III.

these things were made clear to the workers, they would understand that the foreman who is enforcing shop discipline by insisting that they maintain proper quality in their work is really doing them a favor.

Ideally, you might say, every man should be his own inspector. If you can sell that idea to the whole plant, you will have accomplished a big job.

But it is not enough to tell them why they need to give more attention to quality control; you need also to show them some of the spots were they can direct their attention specifically and get results. A few of the major factors which basically affect the quality of any manufactured product would be:-the basic design, which of course is not your responsibility or the workers, but which should certainly pass the test of the practical experience of the shopmen instead of having them casually accept it. It too often happens that the design is incomplete anyway, or the prints are not accurate or are incomplete, and the foreman and/or workers should catch these things before material has been spoiled and time wasted. Competitive cost limitations also put a direct limit upon quality, but the workers should be able to produce the optimum quality under the conditions and materials given Specifications should be accurate, first, and should be followed to the letter, second. If the man can't read the drawings and prints, somebody should teach them. If they can't handle micrometers and snap or plug gauges, somebody should teach them and see that they do.

The class of workmen producing the goods of course, is a little out of your hands, and with present labor shortages it is a little out of everybody's hands. However, a sound method of training new workers as to the correct way to do a job quickly, and conscientiously as to quality, is available



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For 55 years, Sebastian precision lathes have been commended by those who turn out precise metal parts.

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to all war industries thru the Training Within Industry Division of the War Manpower Commission, and it has been found to give very good results in cutting down training time and improving quality of workmanship.

The type of machinery used on the jobs will depend upon what is available in the plant, and you more or less have to do the best you can with what you have. However, a certain respon-

sibility in this matter of maintaining the highest possible quality of work-manship rests with the people who do the production planning in your plant. They should see that, insofar as is practicable, the machines are used by the men best able to handle them for the purposes for which they are best suited.

With top management crying for production, foremen sometimes put too much pressure on workers to turn out volume. New workers are especially prone to worry about meeting production quotas and standards, and to work too fast before they have completely learned how to do the job. It is sometimes hard to slow down and do the job properly, but if it is not done right, it is no good to anybody, and it is surely a case of haste making waste.

A large responsibility, of course, falls on your shoulders in the inspection department. You are the last hurdle, the last chance for the standards which were set up at the beginning of the production cycle, and if you do not maintain the standards, nobody else will.

The material available is another factor, and one which these days is increasing the problem of maintaining quality. If adequate substitutes cannot be found, or if changes in design or styling will not turn out a satisfactory product, the price of the goods on the market may have to be cut or you may have to discontinue operations. Such considerations, of course, are for top management, and the decision rests there.

One other consideration I would put before the other people in your organization. If you are engaged in war production, quality is your first objective. As a manufacturer of small parts which go into other assemblies in other plants, you have a great responsibility. Parts for airplane engines, parts for

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bits from 3/16 to 11/4. Write or FREE literto ature.

anti-aircraft batteries, for the thousand electrical and mechanical gadgets we are using to fight this war must work and be interchangeable. Modern tolerances are finer than ever. Precision in mass production is necessary. And there is no time to make replacements when men at the front are in action. If the production of a single airplane engine is held up by a defective part from your plant, the plane which that engine will carry may arrive in China too late. Remind the boys that they

The management of your company also has certain responsibilities which you might tactfully bring to their attention if you feel that they have been remiss in carrying out those duties. Proper standards should be set for you to follow. It may be that the standards are too high . . . or too low. The product should be designed properly, taking

too are fighting this war on the pro-

duction front.

CROMARI **FAST** TRADE MARK MARKING & NUMBERING MACHINES HELP YOU DO A GOOD MARK-ING JOB. Write for latest catalog CONSULT OUR MARKING SPECIALISTS ABOUT ANY MARKING PROBLEM. THE ACROMARK CORPORATION 915 Merrell St. Elizabeth, H. J.

into account not only its use but also the plant's ability to produce it ef-As far as possible, top ficiently. management should provide the workers with the right machines and tools and instruction on the jobs. An adequate maintenance department should be in operation at all times to see that machinery which is "out-of-kilter" in any respect is not wasting the workers' time and strategic materials. Materials should be purchased which are suitable for the articles to be produced. Customer criticism should be considered seriously and, where feasible, acted The inspection department upon. should be staffed with competent and conscientious people adequately trained for their jobs, and the decisions of the inspection department should be supported in all cases. Testing, research, and experimental facilities should be provided both as a check on quality of goods produced and to discover possible





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Built by the pioneer in accurate gauging wrenches, they are more accurate, practically indestructible they retain this accuracy permanently. They have brought to industry a new means for product control and for gauging and measuring torque in its thousands of applications.

Write for Bulletin describing use of STURTEVANT Wrenches at Wright Aeronautical Co.

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improvements, both in production methods and in the design of the arti-

Top management should also see that wages and working conditions are such that the workers are satisfied and take an interest in what they are doing. To this, management should add trained and competent supervision and keep adequate records so that the weak spots may be located and removed.

If you can put over a few of these ideas in your plant, maybe you will get every worker to be his own inspector, eliminate scrap and rework, and maintain the high quality of workmanship necessary.

A young man in Iowa writes:—"I have been deferred in the draft as class IV--F for physical defects, and have recently obtained a job in the inspection department of a plant here. The work looks interesting, and I think I would like to follow it. Could you give me some general picture of inspection as a career?"

That covers quite a lot of territory, friend, but it seems to me that there are 3 or 4 things you would like to know:—the nature of the work including the variety of things you might have to inspect; the possibility for advancement and possible executive duties; the relationship of your work with other departments; and the income possibilities of the work as a career.



# THEATS ALL WHAT OALL



#### PRODUCTION WOR

For regular run-of-shop jobs, the DoAll handles internal and external cutting with speed an economy. Accurately follows hairline layout on any metro or alloy—blocks a foot thick bars, flats, sheets or tubin—no further machining necessary.

#### URGENT SPECIAL PART

Make them the same day on the DoAll. At left an internal Ratchet out from 1½° steel in o hour. Formerly it was made on a special fixtu in a shaper and required 4 hours. Just o instance in thousands.

#### SEE Do All WORK

Actual performance records of the DoAll may sound unreal to some people, but after you see how speedily the hard-toothed blading eats its way through any metal or alloy, you'll want one or more DoAlls for your own use.

Let us send a factory trained man with a DoAll to show you what it can actually do and save in the way of man hours, man power and metal—how it takes the place of shaper, miller and lathe—how it relieves other machines of overload work.

GET THIS FREE BOOK — "Do Alls on Production" e story in pictures showing many valuable short cuts and how man hours are stretched in a large variety of industries. Write for copy.

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### AND HERE THEY ARETHE RIGHT SIZE FOR EVERY DEPARTMEN EACH MODEL WITH MOTOR





Under \$5000

Under \$2500







Under \$2000

Under \$1500 Under \$10

As far as income possibilities are, they seem pretty good. Almost any day you can pick up a large metropolitan newspaper and see "help wanted" ads requesting the services of chief inspectors of this or that, with very generous salaries. Whether that sort of thing is possible in your present place

of employment, I do not know, but these situations do exist in the whole field, especially in highly specialized lines such as tool and die inspection, precision parts made to close tolerances, and so on.

I take it from your letter that your plant maintains a separate inspection department. Some plants do not, but in either case there are many things you might have to inspect. The whole problem of quality control hangs upon inspection, and it varies with the character of the products in the plant and the processes of manufacture. It usually begins with the raw materials as they enter the plant, and ends with the final inspection or testing. Plans commonly used in inspection are "first piece" inspection or "selective" inspection, which latter involves sampling the run of parts or pieces every so often rather than inspecting each piece individually.

In a prant you have raw materials. partially completed parts, completed parts, patterns, jigs, dies, fixtures, tools, subassemblies, partial assemblies, adjustments, purchased items which are partly or completely fabricated, and a host of other things. The materials may be almost anything from alloy tool steel to cast iron, hardwood, plywood, linen, rag paper, tin, silk, or plastic to suggest a few.

In conducting the tests, you have to consider the article or part as regards



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for dill presses, shapers, milling machines and grinders. Illustration shows our standard milling machine vise as regularly furnished and stocked.

In ordering this vise give size of slot in table: No. 10—6" jaws, 1½" deep, opens 5", wt. 45 lbs., \$38.00 No. 20-10" jaws, 2½" deep, opens 8½", wt. 120 lbs., 52.00

Best material and workmanship. Prices are net f. o. b. Chicago. Dealers inquiries are solicited. Write for folder TODAY.

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We pay ( Public Tributes To the United States (Army) Ordnance Engineers Joy designing The Yanks hich were the Spearhead of the Smashing North African Campaign Gerolor & May Division of Tay Cil Burner Corporation



Have you our Engineering Data Sheets on the new line of

#### BABY GUSHER Machine Tool Coolant Pumps?

Made in four types; 1/30 and 1/10 h. p. for small machine tools and machines requiring from 4 to 10 G. P. M.

Write for descriptive literature.

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Automatic and Hand Operated

for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps. For Marking Metal Parts, Name Plates, Metal Checks, etc. Write for Catalog.

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its conformity to original specifications. These may include size and shape in many different dimensions depending on the complexity of the article, color, taste, smell, weight, hardness, resiliency, tensile strength, elasticity, brittleness, smoothness of finish, chemical composition or something else.

In inspection work, you can bring to bear all of the accumulated knowledge of all the sciences, most of the arts, and a great deal of common sense.

Apart from the intelligence and knowledge which the job requires, there are 2 personal qualities essential to inspection work . . . extreme conscientiousness, and plenty of guts to stand by your decisions and take any objections or abuse which might result.

In your relationships with the other departments in the plant, you of course have to be tactful. If top management backs you up in your decisions, fine. If not, you have to be more

tactful than ever. Aside from that, you can expect pretty good cooperation from the average group of foremen. A good foreman will, in the first place, do everything he can to have as few rejects as possible come back to his department. He will train his men properly, censure poor workmanship and enforce the standards, provide the men with close supervision, check on materials, see that machinery is in condition and is used correctly, see that the right men and machines are used for the different jobs, do everything he can to improve his own ability to control the quality of workmanship.

The good foreman will also educate his men as to the necessity for inspection and will familiarize himself with your duties as inspector and with inspection problems. He will try to promote job pride among his men and will be glad to listen to any suggestions from your department. He will try

# New UNIVERSAL PORTOHOLDER Saves time and money wherever portable for bench assembly. Here are the reasons why: Speeds up production, stops costly tool breakage, eliminates worker faifque, and is adaptable to any tool. Very simple and efficient, compact and rugged, complete versatility and requires only 5 minutes to set up.

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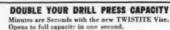
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management prompt and adequate information for quality control purposes is part of it. You would find it varied work and interesting . . . and important.

To err is certainly human, and we must deal with human nature as we find it, hence inspectors and inspection departments. Under perfect foremanship, inspection of material in process would be unnecessary, and final inspection and testing would become a mere formality. The production foreman should always bear in mind that the inspector can only pass or reject work. He should learn to look upon inspection as an expensive luxury to be reduced thru his efforts to a minimum, if it cannot be eliminated entirely. The production foreman bears the responsibility for quality. He can carry on that responsibility by improving his own techniques of supervision, and by cooperating to the extent of his ability with those charged with establishing, enforcing, and maintaining the manufacturing specifications.

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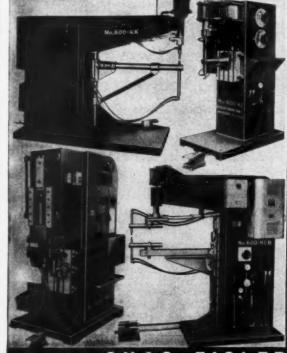


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#### The Electron Microscope



Dr. Simon Ramo and the powerful new G-E electron microscope. The new instrument uses electrons instead of light and easily magnifies infinitesimal particles 10,000 times life size. Dr. Ramo is shown using a much smaller optical microscope to adjust a specimen slide to be inserted in the electron microscope. The new microscope is available for the present, only to war plants and essential industries.

A NEW electron microscope that is mobile, small, and operates on ordinary house current was announced by Drs. C. H. Bachman and Simon Ramo of the General Electric Electronics laboratory recently.

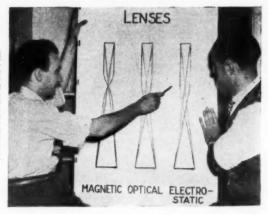
According to Dr. Ramo, development of the new device, makes it possible for small laboratories and war production plants to take advantage of this type of instrument which is capable of producing images 10,000 times the size of the subject.

This electron microscope uses electrons in an entirely different way than earlier electron microscopes, applying electrostatic focusing to the beam of

electrons instead of electromagnetic focusing.

"This step may well be compared." said Dr. Ramo, referring to the new simplified microscope, "with what was done in the X-Ray field years ago when early machines were bulky, complicated, and installed only in the largest institutions. Today, many doctors, dentists, and small clinics have their own small, compact, and easily operated machines."

In the new G-E microscope, the beam of electrons passes thru the specimen inside a vacuum chamber and produces a visible picture on the fluorescent viewing screen. This image can then Dr. Simon Rame and Dr. C. H. Bachman, designers of the new G-E electron microscope are shown studying or schematic drawing of the three types of microscopic lenses. According to Dr. Ramo, the new instrument uses electrostatic focusing, a technique that may in the future enable man to study in the future enable man to study the structure and forces of atoms. Previous electron microscopes used tagnetic lenses while the ordinary instrument employes optical lenses.



be photographed outside the tube, and, if desired, enlarged many thousand times the original size of the specimen for a wall print known as an "Electronmicrograph." Former instruments required taking of the photograph inside of the vacuum chamber.

According to scientists working at the laboratory in Schenectady, unique features of the instrument include the application of electrostatic fields as the electronic lenses. These guide the paths of electron waves thru the instrument just as glass lenses guide light thru ordinary optical microscopes. Earlier electron microscopes used magnetic fields for this purpose.

It is claimed this electrostatic principle can be developed far beyond its present use, and may allow future attainment in microscopy enabling man to see and study for the first time the



Dr. Simon Rame and Dr. C. H. Bachman are shown making the final adjustments on precision mechanism of the vacuum chamber used in the new electron microscope. In this sealed chamber, electrons instead of light, are used to peer into the sub-microscopic world of invisible matter.



This small shaper has found a permanent and dominating place in many nationally known shops, because of its exceptional merit, expressed in a grade of performance hitherto unapproached in facility of operation, high rate of production, and accuracy of work. Primarily it is a high speed cutting tool. On 6" stroke it has a maximum cutting speed of 182' per minute; and on 12' stroke a high cutting speed of 120' per minute.

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Electron micrograph enlargement of a particle of salt, ordinarily invisible to the naked eye. Here it is shown 6000 times original size. Even this sub-microscopic particle shows the Allies' V for Victory.

structures and hidden forces of atoms, the smallest known and still invisible

particles of matter.

It is pointed out by William C. White, in charge of the electronic laboratory, that "the magnifying power of the new microscope was not selected to attempt an approach to this ultimate, but rather to provide an instrument useful to the solution of immediate war and post war problems confronting the great majority of workers in this field. It is believed that, to these workers, the relative simplicity and ease of operation of the instrument will appeal."

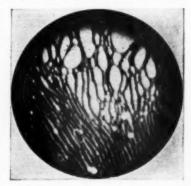
In addition to the development that permits photographing the large image of the specimen directly from the fluorescent screen outside the vacuum, other features are the elimination of the need for water supply, and ease

in inserting specimens.

In designing the new electron microscope, Dr. C. H. Bachman and Dr. Simon Ramo sought a simplified instrument designed as a compact mobile unit that could be plugged into the regular 110-volt a-c house circuit. The problem was solved after 3 years of research, with the new microscope. The machine is expected to expand the use of electron microscopy in laboratories now engaged in war work and medical research—and eventually to find wide usage in high schools and colleges.

Due to present priority requirements, the device will be available for use only in essential laboratories and war plants. It will not only enable scientists to look at greatly magnified physical appearances; it also reveals the actual composition and structure of minute particles. They can also study impenetrable substances such as war metals, clays, plastics and synthetic rubber by improved transparent replicas.

The device uses the relatively small electron waves instead of light waves because their shorter length makes it possible to study much smaller objects than could be achieved with visible light waves. Light travels in waves of about 1/42,000th of an inch in length, and objects must be at least half that long before they can be seen under the ordinary optical microscope. Prior to the electron microscope, when objects to be viewed were smaller than this, it was impossible to obtain sharp



Electron micrograph of carbon steel, showing a small particle enlarged about 6000 times.

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Invisible particles of smoke look like this to the operator of the new electron microscope. Enlargement is 6,000 times original size.

images, so that further useful magnification at that wave length became impractical.

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MOSLO MACHINERY CO. 2443 PROSPECT AVE. CLEVELAND, OHIO The new microscope has an overall height of 52 inches, and requires floor space of about two or by three feet. The cabinet includes the simple power supply, the mechanical vacuum pump, and an air-cooled, oil-diffusion high vacuum pump. A camera is provided for mounting on front of the instrument for photographic reproduction when this feature is desired. The cabinet is mounted on casters for mobility, and weighs 600 pounds. No special facilities for operating the instrument are needed, and the unit includes the microscope proper and all auxiliaries.

Physically, the, microscope has been designed for the convenience of the The electron chamber is operator. mounted horizontally, the eye piece at one end being at eye level for an operator seated before the instrument. The electron chamber is supplied with voltage and is evacuated from the end which extends into the cabinet. All controls are at the operator's finger-These include accelerating voltage, image intensity, the main vacuum valve, focus control, and the movement of the specimen. In effect, the operator is seated at a desk with a drawer beneath so that materials and notebooks are conveniently at hand.

The new machine can peer into the sub-microscopic for scientific study in an invisible world far beyond reach of ordinary optical microscopes. Dr. C. H. Bachman says there is hardly a field of science where the extra acute vision of the electron is not of advantage. This includes physics, chemistry, engineering, agriculture, biology, and medicine.

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## "Let's Talk Shop!"

#### Rejuvenating Worn Tools

By J. S. Gillespie, Engineer, Carboloy Co., Inc.

WHEN your high speed steel cutters are "worn out", don't scrap them. They are still good-on the same jobusually for several times the original life of the tool.

A simple way to reclaim these tools is to braze carbide tips to the cutting surfaces of the tools, letting the tips project slightly beyond the edges of the tools and then grinding to size. Then when the tools wear undersizeand they will probably take a lot longer to do this than did the original tools-they can be brought back to size by moving the tips out slightly. To do this, heat the tips until the braze is loosened and then move out enough for regrinding.

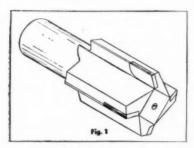


Fig. 1—A high speed steel core drill which has worn undersize, can be salvaged by milling recesses in the faces and brazing in standard Carbololy ce-mented carbide tips. The tips are then ground to original tool dimensions. The same process can be used before the tool is worn below size if it is desired to increase cutting speed or reduce consumption of tools.

This procedure of tipping h.s.s. tools may be followed, as a matter of fact, not only for the purpose of reclaiming such tools when they are worn out, but actually before the tools are completely undersize. Even new tools in stock may be tipped when it is desirable to convert operations immediately to carbides for increased production.

The process has the definite advantage of greatly increasing tool economy. It usually costs less to tip a tool with carbide than to buy a new tool and the tipped tool lasts longer. Furthermore, the practice conserves strategic tungsten, since an ounce of tungsten properly used in a carbide tip will do the work, in many cases, of several pounds of tungsten in other forms of cutting tools.

Grinding the HSS Tool

Initial procedure in reclaiming a multiple point tool is to grind back the faces to which the tips are to be brazed. The depth to which these faces are to be ground depends on the thickness of the tip to be used. During brazing, the tips should be placed so that they line up, of course.

It is not necessary to grind a recess for the tip. The latter may be brazed to a flat surface, since tool loads are rarely so great as to demand a sup-

port around the tip.

Prime difference between tipping an ordinary steel shank and a high speed steel shank with carbide is that greater care has to be taken to prevent oxidi-zation. When you heat h.s. steel, there is a tendency for the chrome contained in the steel to be "driven out".

If the chrome is allowed to oxidize, it forms a coating to which it is difficult to make a braze adhere, since

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standard brazing compounds will not "wet" chrome oxide properly.

To overcome this is not difficult, however. The main things to observe are to heat the shank quickly and no more than necessary, and to use plenty of flux to keep the chrome from oxidizing. It also helps to move the tip with a rod if possible when the shank is heated to help "wet" the steel surface with the Easy-Flo No. 3.

Brazing

When the tip is brazed to the shank, it is allowed to stick out slightly over the edge of the steel. After all the tips are brazed in place, the complete tool is then re-ground down to the proper diameter, etc.

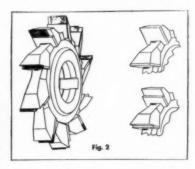


Fig. 2—Reclaiming a double face mill. Teeth of the high speed cutter are ground down, and carbide tips are brazed to the faces. Note that tips are staggered so that every tooth cuts on one side, and intermediate teeth on the other. Detail views show the cutter teeth before grinding and after grinding, before brazing the tip in place. After brazing, the tips are ground to original cutter specifications, taking care that rake and clearance angles follow recommended Carboloy carbide tool practice.

When the tool wears down in service, to bring it back to size it is necessary merely to apply heat to the tool, loosen the braze, move the tips out slightly, and allow the braze to set again. The tool is then re-ground to proper size. This procedure can usually be repeated several times during the life of the average tip, and tips



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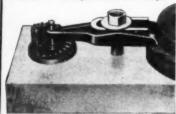
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can be replaced with new tips when necessary. In this way the original life of the tool is multiplied many times.

While the preferable method of brazing tips to steel shanks is to heat the shank rather than the tip, it is necessary sometimes to heat through the tip to keep previously brazed, closely adjacent tips from coming loose. When this is done, care should be taken to heat the entire tips evenly to prevent cracking due to uneven expansion of the carbide.

With short tips a conventional braze is entirely satisfactory. Where tips are relatively long, however, it is usually better to employ a sandwich braze in which a sheet of "constantan" is placed between layers of Easy-Flo No. 3. This helps relieve brazing strains due to possible uneven cooling, and the difference in expansion and contraction between steel and tungsten carbide.

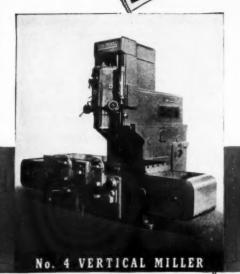
In heating either through the shank or the tip, it is desirable to use a torch small enough to concentrate the heat where needed and large enough to provide effective heating of the entire areas desired. The tip, Easy-Flo No. 3, and flux, of course, should be in place before heating is begun, to avoid oxidizing.

This tipping procedure is being currently followed for such wide ranges of tool classifications as conventional milling cutters, reamers, counterbores, side mills, core drill, spot facers, fly cutters, end mills, etc.

#### Alco Tools Catalog

Containing full dimension specifications and prices, Catalog No. 3, Alco Tool Co., 252 Birdseye St., Bridgeport, Conn., points out savings in time and materials and increased efficiency available to automatic screw machine departments. The book goes fully into details of dimensions and specifications, with prices on its complete line of screw machine drill chucks, acorn, button type and releasing tap holders and hollow mill holders, incorporating special Alco features that make for speedier, efficient operation on new as well as old machines.

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#### Use of Cemented Carbide Tools

(This is the 7th in a series of articles on cutting tools by Carroll R. Alden, Research Engineer, Ex-Cell-O Corp., Detroit, appearing in their excellent house magazine, Tool Tips, and reproduced here by permission. It is intended as introductory material for the many new workers entering War Production.)

It is not possible in an article of this extent to tell which cutting material will be found best for each case. It has already been shown that the cutting problem changes with each change in the material to be cut and the conditions for cutting it. The three carbides previously mentioned are, therefore, mixed in various percentages to form a dozen or more cutting materials with different degrees of hardness and strength. Even the the spe-

cial properties of each could be described here, it would still be much wiser to leave the selection of cutting materials and the design and manufacture of the completed tools to tool engineers of ability and experience. It is easy to see that tools that have successfully machined a certain material under certain conditions could not be expected to make so good a record if either the material to be cut is changed or the conditions of cutting are different. In fact, the wise operator will consult the maker of the tools before making such changes so as to avoid disappointing results or breakage of the tools. This is a course that should be followed wherever there is any definite change of conditions. To take advantage of the experience of the maker of tools, wherever such

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5 5½ 6	30 28 25	34 31 28	38 35 32	42 38 35	46 42 38	50 45 41	53 49 44	57 52 48	61 55 51	69 62 57	76 89 64	84 76 70	92 83 76	106 98 88	122 110 102	131 124 114
61/2 7 71/2	23 22 20.4	26 25 23	29 27 25	33 30 28	35 33 31	38 36 33	41 38 36	44 41 38	47 44 41	53 49 46	59 54 51	65 60 56	70 65 61	82 76 72	94 88 82	106 98 98
81/2	19.1 18.0 17.0	21 20.2 19.1	24 22 21.2	26 25 24	29 27 25	31 29 27	33 31 30	36 33 31	38 36 34	43 40 38	48 45 42	52 49 47	57 54 51	66.9 62.0 60.1	76 72 68	80 70
9½ 0 1 2	16.1 15.3 13.9 12.7	18.1 17.2 15.6 14.3	20.1 19.1 17.4 15.9	22 21.0 19.0 17.5	24 23 20.8 19.1	25 24 23 21.2	28 27 24 22	30 28 26 24.4	32 31 28 25	36 34 31 29	40 38 35 32	44 42 38 35	48 46 41 38	56.0 54.0 48.0 44.0	64 62 56 50	77 61 61 51

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- 5. BREAKING AND CHIPPING ON EDGES?
- 6. WEARING OUT HONES TOO RAPIDLY?
- 7. CAPABLE OF BEING SATISFACTORILY SOLVED?

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can be done, is always a wise thing to

Like every new discovery that shows startling results under conditions allowing its most effective use, cemented carbide cutting tools run the risk of being considered the solution to all metal cutting problems and the cure for all tool ills. This is not the case.

Just as there are circumstances under which cemented carbide tools properly designed, properly built, and properly applied to the job will show much better results than any other known cutting material, there are also conditions to which the properties of cemented carbide tools are not well suited. These conditions are now well known. Disappointment will be avoided if cemented carbide tools are not applied to jobs where these conditions exist.

For instance, if high speed steel tools are being broken under the existing cutting forces, it is to be expected that cemented carbide, known as not being so strong as high speed steel, will surely break under the same circumstances. Or, if the edges of high speed steel tools are being chipped thru vibration or chatter, it is certain that cemented carbides, which are more brittle than high speed steel, will do no better unless the lack of rigidity in the ma-

chine or in the mounting of the tools that has been causing the chipping is remedied at the time the change in tools is made.

If, on the other hand, high speed tools are being burned by the cutting speed, or if they must be sharpened too frequently in order to keep them in proper cutting condition, the life of the tools may then almost surely be increased by proper application of cemented carbide tools.

#### 1-Short Chip Material

The greatest improvement over other cutting materials is usually shown when tungsten carbide is properly applied to the cutting of short chip materials, such as cast iron, malleable iron, brass, bronze, aluminum, etc.

#### 2-Long Chip Material

Successful application of cemented carbides to the cutting of the long chip materials, such as the various alloy steels of forged or bar stock in the annealed conditions, usually presents problems that require expert knowledge, considerable experience, and frequently some experimentation. Before finding the grade of cemented carbide best suited, there have to be also considered the tool shape, cutting speed, feed, depth of cut, cutting compound, and other conditions under which each

		RELATIVE	CUTTING	SPEEDS OF	DRILLS	
SIZE	CA	ST IRON			STEEL	
OF		(Soft)		(Medium)	(Hard o	or Tough)
DRILL	R.P.M.	Food	R.P.M.	Food	R.P.M.	Food
14	1500	.006 to .010	1200	800, ot 800.	600 to 900	.004 to .00
36	1000	.008 to .012	800	.008 to .010	400 to 600	.006 to .00
94	750	.010 to .015	600	.008 to 010	300 to 460	.006 to .00
96	600	.012 to .018	500	.010 to .012	200 to 360	.008 to .01
94	500	.012 to .018	400	.010 to .012	200 to 300	.008 to .01
3/8	440	.012 to .020	350	.010 to .012	180 to 260	.008 to .01
1	380 340 300	.012 to .020	300	.010 to .012	150 to 225	.006 to .01
11/4	340	.018 to .025	270	.012 to .018	140 to 200	.010 to .01
11/4	300	.018 to .025	240	.012 to .018	120 to 180	.010 to .01
13/6	275	.018 to .025	220	.012 to .018	110 to 165	.010 to .01
11/2	250	.018 to .025	200	.012 to .018	100 to 150	.010 to .01
196	235	.020 to .030	185	.012 to .018	95 to 140	.010 to .01
134	220	.020 to .030	170	.012 to .018	90 to 130	.010 to .01
13/8	205	.020 to .030	160	.012 to .018	80 to 120	.010 to .01
2	190	.020 to .030	150	.012 to .018	75 to 114	.010 to .01
21/4	170	.020 to .030	130	.015 to .020	65 to 100	.012 to .01
21/2 234	150	.020 to .030	120	.015 to .020	60 to 90	.012 to .01
234	140	.020 to .030	110	.015 to .020	55 to 83	.012 to .01
3	125	.020 to .030	100	.015 to .020	50 to 75	.012 to .01

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carbide will do its best work. It is advisable now to explain some of these machining terms, as commonly used.

Cutting Speed

Cutting speed refers to the rate of relative movement between the cutting edge of the tool and the material being cut. It is more commonly referred to as speed and is usually stated in feet per minute (fpm). For round work the cutting speed of work being turned or bored may be calculated by

 $speed = \pi d \times rpm = 3-1/7d \times rpm$ 

12

12

#=3.1416 (approximately 3-1/7)
d=diameter of the work in inches
rpm=Rotation of the work or tool in

revolutions per minute.

To save calculations some machines are provided with plates showing the rpm of the machine spindle in different gears or the speed in feet per minute for a piece of one-inch diameter, the latter to be multipled by the diameter of the piece being machined to get the speed in feet per minute for that specific piece. Given in this article is a

handy table in which the cutting speed can be quickly found when the diameter and rpm of the work are known.

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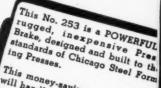
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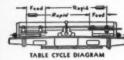
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By M. H. KAUER

Who's Who In Aviation: 486 Pages. Compiled by Writers' Program, Works Projects Administration; co-sponsored by Illinois Aeronautics Commission and Chicago Aero Commission. Publisher, Ziff-Davis Publishing Co., 540 N. Michigan Av., Chicago. \$5.00, postpaid.

A directory of the living men and women who have contributed to the growth of aviation in the United States. The volume gives exhaustive coverage to both civil and military branches of aviation, with biographical details of persons in all branches who have worked toward the advancement of flying. Included are key employees of aircraft and instrument concerns, U. S. Weather Service, Post Office Dept., pioneer pilot organizations, members of Institute of Aeronautical Sciences, school faculty members and members of other outstanding aviation organizations.

Flight: 64 Pages. By W. E. Dyer, Lewis School of Aeronautics, Lockport, Ill., Published by American Technical Society, Drexel Ave. at 58th St., Chicago. 75c, postpaid.

Passed upon by Lt. Commander Nathaniel Rubinkam, USNR, this pamphlet bids well as being among the most practical texts written on aerial navigation. Written by a man with an authoritative record of experience, the work is aimed to inform those without previous knowledge of the subject. Accompanying the book is a handy "Aerial Navigation Slide Rule". There are many illustrations, tables, and quizzes with answers.

How To Read Electrical Blue Prints: Third Edition, 354 Pgs. By Gilbert M. Heine, Drafting Supervisor, Cutler-Hammer, Inc., and Carl H. Dunlap, Head, Electrical Engineering Dept., American School. Published by American Technical Society, Drexel Ave. at 58th St., Chicago. \$3.00, postpaid.

General "how to" information on reading of blueprints, handled in "on-the-job" terms—architectural blue prints, diagrams for bell, signal-wiring and blueprints on house, plant, autowiring, etc. Also diagrams of generators and motors; symbols for control diagrams and power station blueprints. A book for home-study as well as for schools and training programs. 332 illustrations, 41 tables and 8 full-sized blueprints, drawn to scale.

Blueprint Reading For The Metal Trades: 132 Pages. By W. A. DeVette and D. E. Kellog, Vocational Dept., Erie Public Schools, Erie, Pa. Published by Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee.

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Plastics: 295 Pages. By J. H. Dubois, Plastic Dept., General Electric Co. Published by American Technical Society, Drexel Ave. at 58th St., Chicago. \$3.00, postpaid.

A simplified presentation of the making and use of important plastics materials and products, with tables of their properties and basic design data needed by engineers and specifiers. The author is a member of General Electric's plastic department, as well as of the Society of the Plastics Industry, having been associated with the field since its infancy. Book is written in narrative form, with excellent historical accounts and omits formal chemical terms. It is aimed to help those in need of basic design help but who cannot spend time needed for complex study of chemistry or production problems.

Dunwoody Welding Units: Job-Training units in gas and arc welding by the staff of Dunwoody Welding Institute, Minneapolis. Published by American Technical Society, Drexel Ave. at 58th St., Chicago. \$1.25, respectively.

On-the-job texts are complete as they have been used in the training of thousands in trade, vocational and job training classes. Plan and material was developed, tested and improved by Dunwoody Inst., Smith Welding Corp., and Commercial Gas Co., all of Minneapolis. Units consist of jobs, with information and check-up sheets for the first half or more. All are fully illustrated and detailed. Amos Johnson (now on the Dunwoody staff, formerly Supt. of training for the



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bullet assembling machines are the warines specially of this machine tool manufacturer... and one factor that's contributing to their high production quota is sunseen Employage Coming Cal.

Before changing to Suncco, steemive hard made necessary low machine speeds. Production was limited ..., tool life proc. At the recommendation of a Sun Doctor of hadustry—a metal working super—the change in cutting all was made. Improvement was immediate. Tool life increased 40%. Suncco's exceptional heart chearbing qualities permitted high speeds ..., production was increased 40% and the finish of parts was noticeably better.

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aforementioned firms as well as Supervisor of Welding Training, State of Minnesota) directed preparation of the units. It is said that he used the material in qualifying several hundred welders for work on a Navy contract, held by a large Minneapolis concern.

#### 7th Lincoln Welding Book

"Procedure Handbook of Arc Welding Design and Practice," seventh edition, published by The Lincoln Electric Company, Cleveland, Ohio; 1,308 pages, 6x9", 1,810 illustrations, including photos and drawings; cover semi-flexible simulated leather, gold embossed; price postpaid U. S., \$1.50.

Greatly enlarged, the 7th edition of the Procedure Handbook, just published, takes on a new significance

this year.

This "Bible of the arc welding industry," as it is frequently called, is now playing the roll of "manual of arms" for an ever-growing host of workmen which has turned to welding to defeat the Axis powers on the industrial front.

As pointed out in the preface to the 7th edition of the Handbook, which has gone thru 23 printings, U. S. started out handicapped in the armament race with the Axis. But odds are being met by widespread application of welded construction to implements of war.

The authors have made every effort to provide as much complete and upto-date information as possible to help men in shops, shipyards, airplane factories, ordnance plants and arsenals produce to fullest extent. Explained more fully than ever before are the various methods and techniques of welding, with a view to speed up welding design and engineering and make it easier for thousands of men in training to learn the essentials of welding in shortest possible time.

Illustrated more exhaustively and clearly than previously, is the chapter on Typical Applications of Arc Weld-

New and significant information is given in the new Handbook on such subjects as welding symbols, new allowable stresses, pre-heating for welding, stress relieving, procedures, speeds and costs, Fleet-Fillet technique, general metallurgical characteristics of metals and alloys, weldability of aluminum alloys, tubular construction, appearance and styling of welded design and many others.

Ordinarily a co-operative effort, more individuals and concerns have contributed information and photographs for the Handbook in its seventh edition than ever before. The publisher acknowledges the aid of nearly 300 con-

tributors.

This edition of the "Procedure Handbook of Arc Welding Design and Practice," together with Lessons in Arc Welding and Simple Blueprint Reading, also published by The Lincoln Electric Company, and Arc Welding in Design, Manufacture and Construction, published by The James F. Lincoln Arc Welding Foundation, form a complete welding library. The Foundation book comprises 109 outstanding welding studies from the 1937-38 \$200,000 Award Program of the Foundation.



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RELIEF GRINDING can make your tools metal is needlessly cut away. Result: Fewer last longer, and simplify your grinding grindings needed, time is saved and operations, too. This new grinding tools last longer. Send for circular and get method requires but ONE MACHINE the whole story. You'll be glad you did!

Today it is of paramount importance to and ONE OPERATION. By following save both tools and time. CIRCULAR the contour of the tool, no precious

#### Here's Why Tools Last Longer When CIRCULAR RELIEF GROUND:



Note from diagram how CIRCULAR RELIEF GRINDING follows curve of tool, grinds right up to cutting edge and does not cut away valuable metal supporting the cutting edge.



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Today production is too vital - metals too essential-to risk the waste of both because of inaccuracies in machining. Production accuracy starts in the toolroom. Here the CENTER SCOPE enables you to locate to 'within a tenth' regardless of the tolerances on any job. Thus with tolerances to sparejigs and fixtures last longer in production before wear necessitates re-working. Production is speeded and work is more accurately completed.

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There's no mystery about the CENTER SCOPE's infallible accuracy - it's just a question of enough magnification (45x) to allow you to see 'within a tenth." It's a rugged shop tool that quickly and accurately compensates for spindle or adaptor runout, makes old machines more versatile, and easily locates edges to spindle axis.

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EG-10

Power or Hand Feed 8" Between Centers



Power or Hand Feed Grinds 1/4" to 3" Holes



FG-1 FLUTE GRINDER



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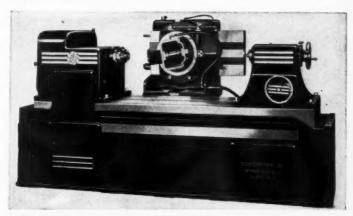


TRS-1 CUTTER GRINDER

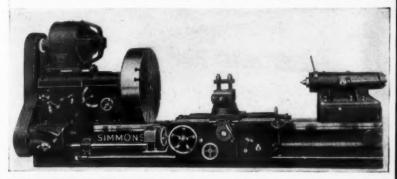
IE GRENBY MANUFACTURING CO., PLAINVILLE, CONN.

## MACHINES of the YEAR

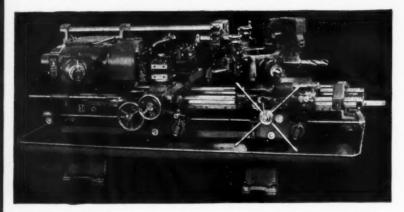
In these pages will be found some of the interesting machines presented during the last year, with condensed descriptions and names of manufacturers, together with index references:



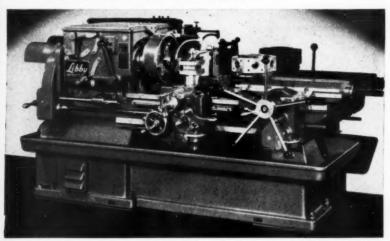
GEAR FINISHING MACHINES—Michigan Tool Co., Detroit, Mich.—A line of gear finishing machines has been developed, making available the crossed-axis principle of gear shaving for large gears. Initiated in the automotive industry, the process is now being used by aircraft engine makers, machine tool producers and many other industries—for mass production and job lot manufacture. (January BB, p. 219)



**HEAVY DUTY ENGINE LATHES**—Simmons Machine Tool Co., 1725 N. Broadway, Albany, N. Y.—Several new models have been added to the line of heavy duty lathes offered by this Company. (July BB, p. 286)



TURRET LATKE—Jones & Lamson Machine Co., Springfield, Vt. 9A and 10A saddle type machines. The former has a maximum round bar capacity of 3½" and will swing 23½" over the way covers. The 10A has a maximum round bar capacity of 5" and will swing 27½" over the way covers. The machines are said to embody all the labor and time-saving features of other Jones & Lamson lathes plus many new refinements such as power traversing and saddle and power indexing of hexagon turret, both operated by one lever through which both high and low, positive traversing speeds can be obtained. (Sept. BB p. 223.)



TURRET LATRE—International Machine Tool Corp., Libby Division, Indianapolis. Machine is supplied complete with tools for bar work and chucking work. Will accommodate 8". 10" and 12" diameter chucks. In addition, machine may be equipped with special attachments conforming to specific applications or specific types of turret lathe work. (May BB p. 169.)



TYPE "G" SELF. OPENING DIE HEAD

## DIES & TAPS

Whatever your production schedules may be, Murchey has a complete line of self-opening dies and collapsible taps designed to produce ord-

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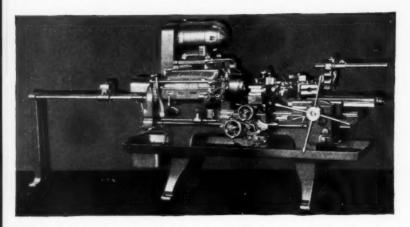
## THREAD MILLING MACHINES

Whether it's a question of size, tolerance, or producgion, Murchey Thread Milling Machines cover a wide range in cutting external or internal threads.

The use of full-length annular milling cutters
with accurate control
of, pitch and depth
produces precisioncut threads at a production rate which
will interest you.

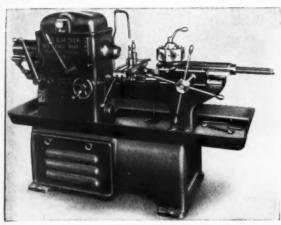
WRITE FOR DETAILS OF THESE AND OTHER MURCHEY MACHINES.

MUDALLEY MACUINE IN TOOL CO.



TURRET LATRE—International Machine Tool Corp., Foster Div., Elkhart, Ind. The No. 5 Universal ram type machine has a collet chuck capacity of 2" diameter and 171/4" swing over ways. It is supplied complete with tools for bar and chucking work and will accommodate 8", 10" and 12" diameter chucks. Other attachments are available for specific applications. (Nov. BB p. 258.)

TURRET LATHE-G. M. Diehl Machine Works, Wabash, Ind. This No. 2 lathe offers 6 forward and 6 reverse speeds obtainable without stopping machine.



Collets up to 1" may be used. Specifications of spindle, cross slide and turret provide for interchanging of tools with other standard No. 2 lathes. Swing over bed is 14"; over crosslide 6". Hole thru spindle is 114"; thru collet tube 116" and od of spindle nose is 2%". Diameter of hexagon turret across flats is 71/2" and turret holes are 1" in diameter. (May BB p. 174.)



## PRECISION BENCH LATHI

## A new stream-liner incorporating all the old Stark accuracy and stamina

HE first tool of its class with built-in Motor and speed changing mechanism (patented). Marvelously compact: nothing under the bench; no special bench or cabinet needed; even bolting down unnecessary:

Simply moving control lever to right engages the clutch, vertical position releases; moving to the left instantly brakes the moving spindle.

Standard (tool room) Model has time-tried double taper spindle bearings 156 to 2200 r.p.m.—the best for sustained accuracy.

High Speed (manufacturing) Model fitted with best precision pre-loaded anti-friction bearings, 260 to 3500 r.p.m.

Both have 40 inch bed, 9 inch swing, 20 inches between centers; either ¾ or 1 inch collet capacity. Take regular STARK Attachments collets and chucks.

This Stark (patented) built-in drive, integral with the Lathe itself, employs a ½ h.p. geared ball-bearing motor drive through a disc clutch, and through V belts to the headstock, giving any split speed at the turn of the small hand wheel in front of operator.

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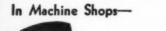


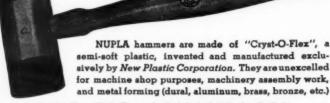
## **NUPLA PLASTIC HAMMERS**

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#### TWO HARDNESS GRADES: Grade A—General Machine Shop Use.

Grade B—Hardened Cryst-O-Flex for Metal Forming.

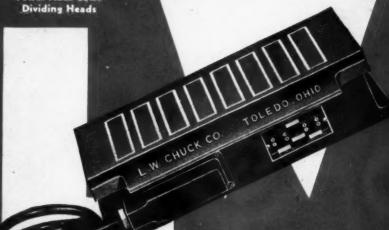
SIZES	WEIGHT:
1-7/8"	15 oz.
1-1/8"	24 oz.
1-7/8"	2 lbs.
1-3/8"	8 oz.
1-3/8"	17 oz.
1 .	5 oz.
1 *	8 ozl

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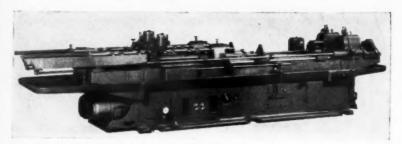
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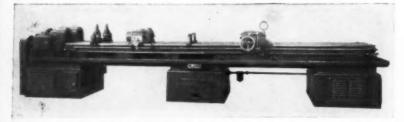




**RIPLING MACHINE**—Foote-Burt Co., Cleveland, Ohio. This Ex-Cell-O rifling machine, for 30 and 50 caliber, is of the electrically and hydraulically operated type. It has 2 operating stations, each fully independent of the other. The unit for a 30 caliber only takes 30" barrels, the 30 and 50 caliber unit takes 50" barrels. (Sept. BB p. 224.)



**DEEP HOLE DEILLING-BORING MACHINE**—W. F. & John Barnes Co., Rockford, Ill. The No. 445 is designed to drill or bore 2 parts simultaneously in completely independent cycles. Each work piece is driven by an independent headstock and supported by separate steadyrests. Tools are fed by independent hydraulically actuated slides. (Dec. BB p. 240.)



GUN, DRILLING AND REAMING MACHINE—Builders Iron Foundry, 21 Codding St., Providence, R. I. This double spindle machine is arranged for deep hole drilling from the solid. Machine can also be used for draw type or push type reaming and boring, as the machine is provided with a sufficiently wide range of speeds and feeds. (Jan. BB p. 222.)



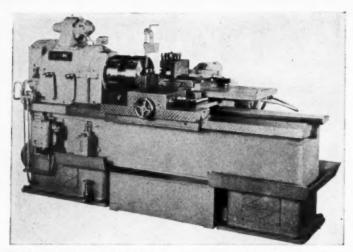
The all purpose "Utility" saw you need for your general shop cutting—for maintenance work—for auxiliary sawing in your cut off departments. It gives you fast, accurate cutting with sensitive hydraulic control for cutting off the full run of materials from tool steel to thinnest walled tubing. It has two speeds—6" x 6" capacity—swivel vise for cutting angles and is made in wet or dry cutting types. It is a soundly engineered "Utility" machine designed for general all purpose work.

Write for information on these saws or on any one of the many RACINE models from "Utility" types in 6" x 6" capacity to production types in 6" x 6", 10" x 10" up to 14" x 20" capacity—also fully automatic bar feed machines—we will be glad to give you production estimates without obligation.

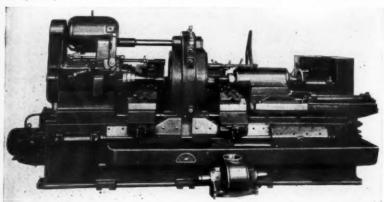
## "RACINE

STANDARD THE WORLD OVER"

## RACINE TOOL AND MACHINE COMPANY 1754 STATE ST., RACINE, WISCONSIN



AYDROMATIC LATHE—The Norwood Engineering Co., 94 N. Maple St., Florence, Mass. Four standard Norwood models are available for the different operations in turning shells from 50 to 155 mm. Model ST-1 is for centering and cutting-off the shells. Model ST-2 is for rough turning. Model ST-3 takes care of boring the nose and rough facing, rough reaming, finish reaming and facing. Model ST-5 is for cutting off and finishing base of shell and cutting the band groove. (June BB p. 183.)



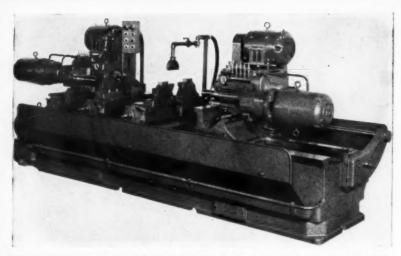
HYDRAULIC TURNING MACHINE—Snyder Tool & Engineering Co., Detroit, Mich. This heavy duty, double end machine is capable of speeding up production jobs. An interesting feature is the hydraulic feed operated from a single Snyder power unit in rear of machine. This unit furnishes power to front and rear tool slides as well as to tailstock. Tailstock movement is controlled by hand operated valve which facilitates loading and unloading of piece by pushing it forward into center drive fixture. (July BB p. 230.)



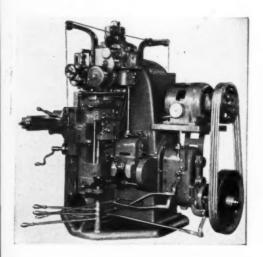
Here is a great cost-reducing machine which provides precision grinding results on a high production basis. We will be pleased to furnish you with complete details regarding the advantages of the Mattison Surface Grinder as applied to your work.

Cape previously ground few at a time on small greater. New Measures Greater has reduced time from 7 hours to 30 microsts on quantity shows.

MATTISON MACHINE WORKS-ROCKFORD, ILLINOIS



END MILLING AND CENTERING MACHINE—Sundstrand Machine Tool Co., 2535 Eleventh St., Rockford, Ill. This machine is suitable for milling to length and centering (in one handling) both ends of shafts ranging from 11/4" to 6" diameter by 14 to 72" long. A similar machine can be provided for handling shafts 1" to 4" diameter by 8 to 48" long. (Oct. BB p. 241.)



VERTICAL TURET
MILL—Rogers Machine
Works, 135 Arthur St.,
Buffalo, N. Y. Features
stressed by the maker
include convenient handling of work; quick, easy
chucking; minimum setup time; fast traverse;
foot operated control;
especially designed swivel head, etc. (Sept. BB
p. 250.)





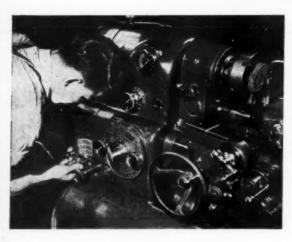


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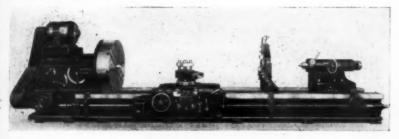
TURRET LATHE — Gisholt Machine Co., Madison, Wis. Two new saddle type lathes known as 3-R and 4-R, are especially adaptable for war production. The former has 5¼" spindle bore, 21" chuck, 28½" swing over ways, 26" swing over carriage wing, 21½" swing over cross slide. The 4-R has a spindle bore of 9¼". 24" chuck, 31" swing over ways, 27½" over carriage wing and 24½" swing over cross slide. (May BB p. 196.)





MULTI - SPEED LATRE DRIVE— Monarch Machine Tool Co., Sidney, Ohio. The new Reliance drive, offering an unusually wide speed range is incorporated in Monarch 10" toolroom lathes. The overall range of spindle speeds is from 4½ to 2500 rpm. (March BB p.

**LATHE**—Simmons Machine Tool Corp., 1725 N. Broadway, Albany, N. Y. Improved designs of Simmons 48" and 54" heavy duty lathes are available. Any length bed can be furnished. Either 4 or 6 speed changes are provided to the internal face-plate thru sliding spur tooth gears and one heavy jaw clutch. Taper attachment gives a maximum taper of 5" per ft. for lengths up to 48" at one setting. (July BB p. 286.)



# formation



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This heavily illustrated catalog covers the complete line of Cincinnati All-Steel Shears.

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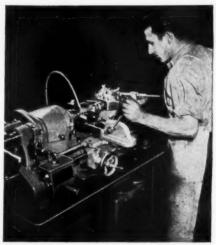
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Cincinnati All-Steel Shear Catalog S-2.

CINCINNATI, OHIO

TURBET LATHE — South Bend, Ind. This small model is intended for rapid production to close tolerances on chucking operations or bar work. Its 10" swing over bed and saddle wings; 1%" hole thru headstock spindle and 1" collet capacity adapt it for second operation work. A quick change gear box provides 48 longitudinal power feeds for the universal carriage, 48 power cross feeds for compound rest cross slide, and 48 thread cutting feeds. (July BB p. 258.)





TURRET LATHE—South Bend Lathe Works, South Bend, Ind. The 2-H model has a capacity of 1%" thru spindle hole, 16" swing over bed and saddle wings and 1" capacity thru collet. (March BB p. 246.)





## **FITCHBURG**

AUTOMATIC MULTIPLE PRECISION GRINDING

Saves Money Man Hours and Material



#### ON HIGH SPEED WORK

Fitchburg Standard Bowgage Wheelhead units like this can be mounted on your present machines to increase production and accuracy control.



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Fitchburg Automatic Multiple Precision grinding with special machines like these using standard Bowgage Wheelhead units — easily adaptable to other work if operations change or discontinue.



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Fitchburg gives you greater accuracy at higher speed reduces assembly time — divides torque pressure more evenly and produces finishes that give more even wear on sliding splines at high speed.



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Fitchburg utilizes the formed wheel method with automatic closed cycle, enabling new operators to be quickly trained to produce accurate work with fine finish at higher speeds on these machines.



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The special Bowgage Chucking Grinder with a heavy duty headstock, is designed for grinding the ojive of the 75 MM armor piercing shell.



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New Fitchburg Type B Plain cylindrical grinder with complete automatic cycle including rapid traverse to work, proper grinding feed, spark out time, and rapid return, for small lot or mass production grinding

BURG GRINDING MACHINE

FITCHBURG, MASSACHUSETTS, U.S.A

Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Geor Grinders, Bath Full Universal Grinders and Special Purpose Grinders

VERTICAL CHUCKING MACHINE-

Nylen Products Co., Machine Tool Division, St. Joseph, Mich. This new 6" Nylen will turn and face or bore and face, or contour and dome in one simultaneous operation. Machine is designed to speed mass production and is said to be simplified so that unskilled labor can turn out precision work in volume. (March BB p. 273.)



TURRET LATHE—The Logan Engineering Co., 4901 Lawrence Avenue, Chicago, Ill. The No. 830 hand screw machine has a capacity of %" round bar stock. The makers emphasize the usefulness of this smaller unit in releasing larger machines for heavier work. Among the accessories is a new speed collet chuck for round work, fed thru spindle. (Oct. BB p. 362.)



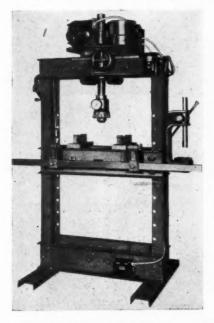


CHUCK — DEMAGNETIZER—Anderson & Brown Co., 2034 E. 22nd St., Cleveland, Ohio. Small for its magnetic holding capacity, this chuck is readily portable. May also be used as a portable demagnetizer. A compact rectifier is included as part of chuck ensemble so the unit supplies its own low voltage d-c current energized from any convenient a-c outlet. (July BB p. 304.)

## PRESENTATIO

## Automatic Pressure Control is Ideal for TOOL ROOM OR PRODUCTION LINE





By setting the control gauge on the Lempco Electric Arbor Press, you can duplicate exact working pressures on your die try-outs. Equally efficient for press-fitting or assembling operations on production schedules. Solenoid controls stop ram at any pre-selected pressure—or even back ram off work if desired. Fast-action from 0 to 60 tons in 4 seconds! Moveable heads; adjustable bolster; foot-pedal switches; re-set switch and thermal relays protect motor from overloads. Pressurematics are made in both Electric and Hydraulic models.

Lempco flies the "E" for excellence in war production.



Prompt Delivery! Priorities Can Be Had - Write Us.

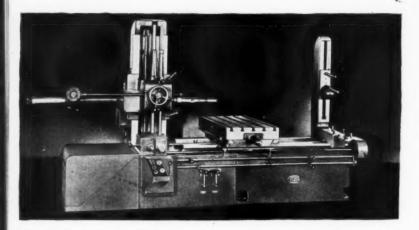
LEMPCO

PRODUCTS INC. BEDFORD OHIO U.S.A ESTABLISHED 1919 SEE ONE WORK - MAIL THIS COUPON

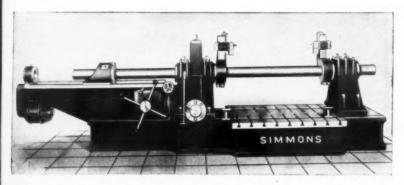
Lempco, Dept. 88 Bedford, Ohio GENTLEMEN: Tell me plant nearest me where I may see a LEMPCO Press in operation.

NAME......

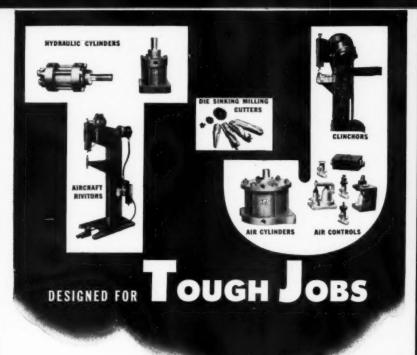
CITY.....STATE.....



HORIZONTAL BORING MILL—The Yoder Co., Cleveland, Ohio. This machine features "power touch control" in which touch and turn of the hand control replaces gear shifting levers. A 16 to 1 speed variation is provided on spindle and feed. Synchronized vernier scales are provided on head column and outer support. Controls are centrally grouped. (Oct. BB p. 366.)



**HORIZONTAL BORING MACHINE**—Simmons Machine Tool Corp., 1725 N. Broadway, Albany, N. Y. The standard 6" bar machine has a bed 188" long and 51½" wide. Height from top of bed to center line of boring bar is 24". When furnished without center bed section, height from floor to center of bar is 42". Feeds are obtained thru the Micro-Feed Unit, an infinitely variable transmission. Travel of bar is 60" in one setting. (March BB p. 210.)



Proved "on the firing line" in industry's tough jobs for a quarter century... Tomkins-Johnson products are widely known today for ahead-of-the-times performance!

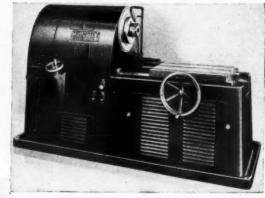
"More and more, men who demand TOP efficiency and accuracy turn to T-J for Rivitors...hydraulic cylinders...air cylinders...cutters...Clinchors...and air controls for a wide range of requirements. Precise

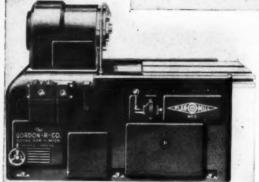
standards of manufacture...plus careful inspection of all materials...are constantly guarding T-J Quality throughout production.

Our "tomorrow-minded" engineering staff and long experience are continually solving new problems for industry—do not hesitate to bring your Tough Jobs to T-J! Write for bulletins. The Tomkins-Johnson Co., Jackson, Michigan.

## TOMKINS-JOHNSON RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

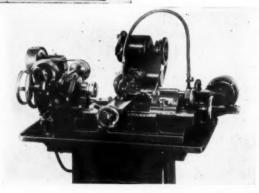
THEFAD MILLER——Murchey Machine & Tool Co., Detroit, Mich. The No. 42 machine shown at the right is intended for mass production of right or left hand, internal or external threads, 4" up to 12" diameter, 3" long, by means of angular milling cutters covering full length of thread. Top of table to center of spindle is 13½"; eccentric motion of spindle is 0 to ¾". Cutter spindle speed range is 33 to 645 rpm. (May BB p. 220.)





TREEAD AND FORM
NILEE — The Plan-OMill Corp. Royal Oak,
Mich. (formerly GordonR. Co.) The No. 5 plan-omill shown at the left
combines the advantages
of planetary milling with
hydraulic operation. Hydraulic motors on spindle
and quill permit a choice
of feeds and speeds by
merely adjusting dials.
Table is also hydraulically operated. (March BB
p. 200.)

Waitham Machine Works, Waitham, Mass, Important changes have been made in the Waitham line of thread millers which are especially designed for small work. Particularly, small pieces which have to be accurately threaded. Various attach ments are available which increase the usefulness of the machine. (July BB p. 316.)





## Eliminate Hardening Distortion Drill AFTER HARDENING with "HARDSTEEL" Drills



Wherever distortion during hardening of drilled steel parts throws drilled holes out of round or out of line—change your shop practice. Harden the part—then drill with "HARD-STEEL" without annealing, as is being done on the airplane crankshaft illustrated. Speed up your drilling—cut your rejects—insure perfect matching at assembly.

"HARDSTEEL" drills work with ease in steels hardened by any process and also the work hardening types. The harder the material—the easier it is to drill, countersink and counterbore.

"HARDSTEEL" grinds quickly on any ordinary wheel—saves time—and drills can be reground many times.

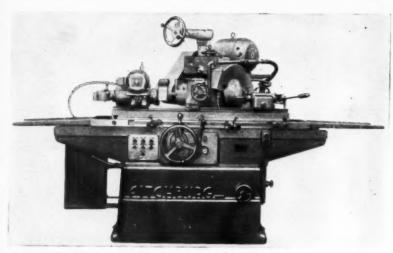
Learn all about the drilling of hardened steels and steel parts. Ask for the "HARDSTEEL" operator's manual—no charge.

BLACK DRILL CO. . 5005 Euclid Ave., Cleveland, O.

YOU HARDEN IT-WE'LL DRILL IT

### "HARDSTEEL"

DRILLS . REAMERS . TOOL BITS . SPECIAL TOOLS



ANGULAR GRINDER—Fitchburg Grinding Machine Corp., Fitchburg, Mass, This newest of Fitchburg's plain cylindrical grinders, type C, is designed to handle a wide range of jobs. (Nov. BB p. 305.)

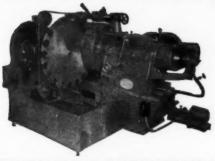


ABRASIVE
BELT SURFACE B—
Hammond Machinery Builders, Inc., 1614
Douglas Ave.,
Kalamazoo,
Mich. The "600"
Hammond is a
Dri-N-We to
prinder and
may be adjusted
from vertical to
horizontal position while it is
running. Belt
tension and
tracking device
also can be adjusted while
running. (June
BB p. 224.)



UNIVERSAL TOOL AND CUTTER GRINDER—Douglas Machinery Co., 150 Broadway, New York City. This attractive machine known as the Rotorex is unusually versatile, performing a wide range of tool and cutter grinder operations. (April BB p. 206.)

### When you have flat surfaces to grind-BESLY GRIND them





THE FIELD OF THE BESLY GRINDER in keeping with improvements in grinding members (Besly Titan Steelbac Abrasive Discs) has broadened out remarkably.

Grinding of brass fuse plates to limits of .0002" for parallelism and flatness at the rate of 60 passes per minute; aircraft piston rings to within .0005" of

finished size at the rate of 80 passes per minute are examples.

Operations on armor plate, machetes, small arms, tank parts and other difficult grinding problems are no longer difficult when approached by Besly engineers. Nor are we limited to metal working. Steatite, refractories, hard rubber, synthetic molded products, brake lining, clutch facings and a myriad of other materials are daily being ground on Besly Disc Grinders.

No well equipped Tool Room or Jig and Fixture Shop



Investigate the possibilities of Besly grinding. The progress made in this field of endeavor will surprise you.



CHARLES H. BESLY & COMPANY 118-124 NORTH CLINTON STREET \* CHICAGO, ILLINOIS



Tool Co., 7171 E. McNichols Rd., Detroit, Mich. Designed for mass production, the 861-4B shown at the left is said to be notable for the speed with which small gears can be finished to high accuracies. It is automatic in operation, with combination cam and electric control. Working mechanism is located entirely in the top casting. (Oct. BB p. 364.)

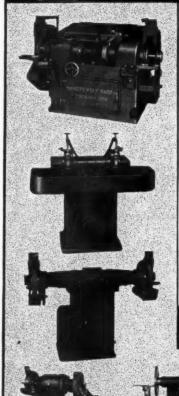


GEAR FINISHING MACHINE—Fellows Gear Shaper Co., Springfield, Vt. The No. 12 machine shown above has complete electrical control and handles a maximum pitch diameter of 12", face width 3" and 6" diametral pitch. A similar No. 24 machine handles 24" mpd, 5" face width and 4" dp. (April BB p. 222.)



GEAR HOBBER—Triplex Machine Tool Co., 125 Barclay St., New York City. Machine shown at left is designed to generate accurate spur and spiral pinions and gears right or left hand, up to 6" diameter and 12" maximum dp. (June BB p. 234.)

## GRINDERS? Sure! All Kinds



Wet Grinders and Dry Grinders
Drill Grinders and Disc Grinders
Grinders with extra wide
wheel spacing
Bench Grinders and Pedestal
Grinders
Lathe Grinders and Center Grinders
Grinders Grinders Grinders Grinders

Grinders for snagging or tools Large Grinders and Small Grinders High Speed or Low Speed Grinders for production or tool room.

Hisey Catalog No. 60 DH lists more than 200 different types and sizes of Grinders from ¼ to 25 H.P. capacity.

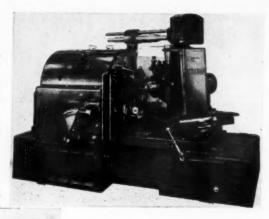
Write for it now.

Also a complete line of Buffing and Polishing Machines in direct drive and V belt drive models.

THE HISEY-WOLF MACHINE CO.



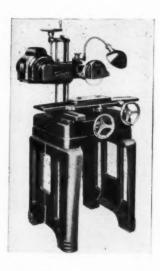
Gleason Works, Rochester, N. Y. With the No. 17 grinder, the teeth of generated curve-tooth, bevel and hypoid gears and pinions may now be finished rapidly by precision grinding. (Jan. BB p. 306.)



ROTARY SURFACE GRINDER—The Taft-Peirce Mfg. Co., Woonsocket, R. I. This 6" machine embodies a tilting wheel head which makes the machine suitable for difficult shoulder work. (June BB p. 236.)



SURFACE GRINDER—Delta Mfg. Co., 604-K E. Vienna Ave., Milwaukee, Wis. The portable unit shown at the right should be useful in tool and production shops, relieving larger machines from work within its scope. Maximum length that can be ground is 13½"; maximum width 6"; maximum space under 7" wheel to table 9½". (Oct. BB p. 302.)





## MODEL ''F'' UNIVERSAL Tool and cutter grinder

Concentration on one model has made possible this sturdy, accurate and resultle grinder at a comparatively law cost.

SPECIFICATIONS: 10" swing: 22" between centers with work head and 26" with L. H. tailstock, table 5" wide, 36" long; 23" maximum table travel: 8" cross feed. 8" vertical movement, table swing around column, 150 degrees in each direction.

STANDARD EQUIPMENT: Wheel head with ground alloy spindle, 3600 rpm, mounted in precision ball bearings and driven by 14 hp totally enclosed motor with switch. V beit drive and guards: Universal work head with 14 hp totally enclosed geared motor, chuck, etc.; R. H. tailstock with spring center; Steady rest and all grinding wheels and fittings necessary for a wide variety of grinding operations.

OPTIONAL EXTRAS: Power table feed with 1/10 hp geared motor, internal grinding attachment, universal vise, and L. H. universal tailstock.

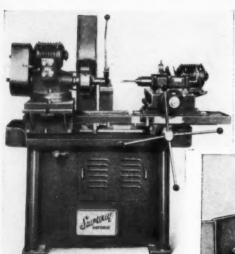
DETAILED INFORMATION UPON REQUEST.

## McDONOUGH MANUFACTURING CO.

EAU CLAIRE,

WISCONSIN

U.S.A.



INTERNAL GRINDER—Sav-Way Industries, Detroit, Mich. Here is an internal precision grinder that will grind holes up to 9" deep and from ¼" to 18" in diameter, straight or tapered sides. Headstock traverse is 6", swing 18", full universal head. Variable V-Belt pulleys provide 4 variations of work head speed. (June BB p. 289.)

## ROTARY SURFACE GRINDER—Portman Machine Tool Co., Mt. Vernon, N. Y. At the right is shown this sturdy machine, which is amply powered to remove stock rapidly and to exacting requirements. (June BB p. 198.)



#### INTERNAL AND EX-TERNAL GRINDERS -The Grenby Mfg. Co., Plainville, Conn. This line includes an IG-10 internal precision grinder and an external grinder known as the EG-10. These are basically the same, the difference being in wheel spindles and method of guarding. The internal grinder is shown at the left.



(Feb. BB p. 147.)

## Here's a Boy who does a Man's Work!

### DIAMOND

MILLING MACHINES

bring you all the features of rapid operation, capacity and precision accuracy that are found in machines of far greater size and much higher in price.-Modern features include ... Precision High Speed Needle Overarm Arbor-Support Bearing-Vertical Collapsible Pulley Arrangement (with safety device and motor lock for speed changes)-Maximum Anti-Friction Bearings, with the Minimum of Manual Lubrication Fittings and a ONE-SHOT Spider Web Lubricating Arrangement for Table, Saddle and Knee.-And, an important feature is PROMPT DE-LIVERY made possible by recent plant expansion.

#### BRIEF SPECIFICATIONS

Model 24

Production or Tool Room Types

SPINDLE: No. 9 B. 6 S. taper and
3/4" hole: SPEEDS: Infinite number,
forward and severse: variable drive
from 75 rpm to 1400 rpm: LONGITUDINAL TRAVEL: 14" with table
feeds (hand screw or power) .003",
.005" and .008" per spindle revolution: TRAVERSE: 6"; VERTICAL
TRAVEL: 10" (middle of spindle to
table top): TABLE SIZE: 53/4"×24"
with 3 slots for 7/16" bolts: COOLANT SYSTEM: complete, independent enclosed unit: MOTOR: 11/2 HP,
DIMENSIONS: height 62", base 18"
24", table overhang maximum 14",
NET WEIGHT: approximately 1.050
pounds. PRODUCTION MODEL
equipped with rack and pinion feed.

#### DEALERS ATTENTION!

Sales of several hundred units in the past two years are responsible for recent plant expansion which doubles our production. Arrangements are being made in certain industrial areas with ethical, financially responsible dealers. Correspondence invited.



Send today for this Bulletin, Gives details on both sizes in Production and Tool Room Models.

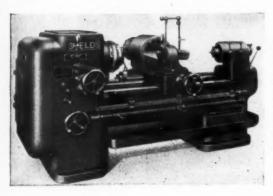
DIAMOND



TOOL CO.

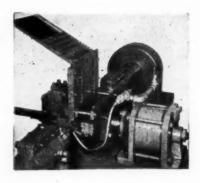
LOS ANGELES, CALIFORNIA

3429 EAST OLYMPIC BLVD.



THREAD MILLING MA-CHINE — Morey Machinery Co., 410 Broome St., New York N. Y. The 12" x 60" Morey-Shields machine for external and internal thread milling is shown at the left. Other sizes available are 12 x 30", 12 x 90" and 12 x 120". Larger machines may be made to order. (Feb. BB p. 238.)

PROFILER—Pines Engineering Co., 600 Prairie St., Aurora, Ill. An automatic chute feed is available for the 2 spindle Pines profiling machine shown at the right. This attachment is used for feeding such items as primer tubes for boring and tapping operations on both ends at the same time. (Sept. BB p. 350.)





SHELL MARKING MACHINE — James H. Matthews Co., 3942 Forbes St., Pittsburgh, Penna. The No. 79 machine shown at the left is designed for high speed marking of 105, 155, 5" and 6" shells. The required data is marked on the shell by interchangeable steel type set up in a roller die in the machine. It can be changed quickly. Depth of marking is controlled by simple adjustment. Capacity is given as 12—155 mm shells per minute. (April BB p. 242.)



## High Speed Steel Tool Bits

Hardened TCM High Speed Steel Bits are made from TCM molybdenum—tungsten high speed steel, cut to size and beveled on the ends to an angle of 25°. Bits are from the higher carbon range to assure the best cutting performance. Each bit is individually inspected for straightness, Rockwell hardness and

exactness to size. In this fully treated condition, Jessop TCM Tool Bits are ready for immediate use and will give superior results. Popular sizes are carried in stock at the mill and at our warehouses for immediate shipment. We invite your inquiries. Jessop Steel Company, Washington, Pennsylvania.

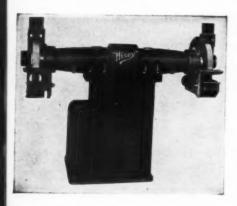
#### JESSOP STEELS

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE





WET CARRIDE TOOL GRINDER— Hammond Machinery Builders Inc., 1614 Douglas Ave., Kalamazoo, Mich. The 20-S shown at the right is a heavy duty, high production carbide tool grinder designed for the use of coolants. Tool rest is adjustable to any required angle. Wheel dresser is integral part of assembly. (Oct. BB p. 274.)



OPTICAL FORM GRINDER -

Wickman Corp., 15533 Woodrow Wilson Ave., Detroit, Mich. The machine shown at the right is designed to finish grind to a high degree of accuracy, any flat or circular form tools, punches and dies, profile gauges, templates, and many other regularly or irregularly shaped parts. It is particularly adaptable to the grinding of tungsten carbide. (July BB p. 229.)



WIDE SWING GRINDER -

Hisey-Wolf Machine Co., Cincinnati, Ohio. An outstanding feature of this machine is the extremely wide spacing of the wheels and the almost unlimited working clearance around wheels, permitting the grinding of large, permitting the grinding of large, awkward pieces. Wheel guards pivot to any angle, have hinged covers, and standard exhaust system connections. (April BB p. 290.)

## It's more than just being **FASTIDIOUS**



... When you collect abrasive dust in your plant or machine shop, because abrasive dust exhausted from cutting, grinding, buffing machines is a dangerous saboteur of machines and a menace to employee health.

Today our all-out war production must not be hampered by lost man hours or machine breakdowns. Insure your production schedules by installing Torit Dust Collectors where needed. Torits are portable, simple to install, and economical to operate.

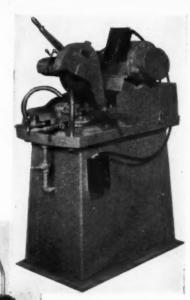


MANUFACTURING CO.

303 Walnut Street St. Paul, Minnesota

TORIT Dust Collectors SELF - CONTAINED UNI

ABRASIVE CUT-OFF MACHINE—A. P. DeSanno & Son, 442 Wheatland St., Phoenixville, Pa. A sturdy and versatile machine adaptable for cutting off bars, tubing and form shapes. Two types of vises are available, vis., for straight cuts only and for straight or angle cuts up to 45°. Special features include hand operated vise, non-tiring handle, use of stubs of abrasive discs from larger machines and elimination of vibration. (June BB p. 214.)



ABRASIVE CUT-OFF MA-CHINE—The Challenge Machinery Co., Grand Haven, Mich. Machine has capacity up to 1" round and has an adjustable table, 15x14". Equipped with elastic cutoff wheel 6x1/32"x½". Adjustable safety guard. Ballbearing spindle is used. (Sept. BB p. 293.)

&AW SHARPENING MACHINE—Howe & Son, Inc., Hinsdale, N. H. An automatic sharpening machine for hacksaw blades, bandsaw blades, circular saws and metal slitting saws. It takes hacksaws of any length, width or pitch; bandsaws of any size, circular saws. Once adjusted to a given saw, it is said to be entirely automatic. (April BB p. 258.)

# ALMOND



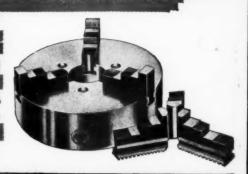
## THE ORIGINAL MANUFACTURERS OF DRILL CHUCKS

The ALMOND Three-Jaw Drill Chucks were the first to be placed on the market. They were Pioneers in the field of drill chucks. For over Seventy years Almond Chucks have formed a necessary part in the logical procedure of machine developments. Are made in types and sizes to fit all machine tools and portable drills.

#### LATHE CHUCKS

Almond Universal Geared Scroll
Lathe Chucks are
made in sizes
from 4' to 15'.
Independent
Lathe Chucks
from 6' to 24'.
Bodies of SemiSteel Castings.

Write for Bulletin No. 237.



### T. R ALMOND COMPANY

ASHBURNHAM,

MASS. U. S. A.

VERTICAL POWER SAW - The Peerless Machine Co., Racine, Wis. Improvements have been made recently in the Peerless vertical cutting power saw. Extension of the work table to 35" permits handling of extremely large work which can be lowered and readily removed from the saw by crane. Huge slabs of tool steel as long as 24" and any thickness up to 10" now can be sawed through without turning the work. (March BB p. 196.)



**DOALL CONTOUR SAWS**—DoAll Co., 1206 Thacker St., DesPlaines, Ill. Here is a glimpse into the well-equipped DoAll Contour Saw laboratory. Several models of DoAll Contour Saws are shown, made by Continental Machines, Inc., 1300 S. Washington Ave., Minneapolis, Minn. The laboratory is in a building separate from the saw manuacturing plant, and here many customers' sawing problems are solved. The laboratory is complete with everything from photomicrograph and Rockwell testing equipment to a special darkroom. (October BB p. 298.)



### Tool Conservation begins in the Tool Crib



Photograph-Courtony General Electric Company, Philadelphia

LONG, efficient tool life may be as much due to care in receiving, storing and handling in the Tool Crib as to proper use out on the job.

Here is an example of a carefully thought-out tool crib arrangement that pays substantial dividends to its plant in dollars and time saved. After use each Tap is carefully wiped clean of grit and chips before being restored to its proper place. The shank is placed in its individual recess, leaving the cutting edges free from chance blunting or chipping against other Taps.

This arrangement takes into consideration the size, shape and physical peculiarities of these tools to insure safety of storage, speed of locating and ease of handling.

#### GREENFIELD TAP AND DIE CORPORATION

GREENFIELD . MASSACHUSETTS

DETROIT PLANT: 5850 Second Boulevard
WAREHOUSES in New York, Chicago and Los Angeles
In Canada: Greenfield Tap and Die Corp. of Canada, Ltd., Galt, Ont



TAPS · DIES · GAGES · TWIST DRILLS · SCREW PLATES



HYDRAULIC HACE SAW-

L. B. Manufacturing Co., Box 155, Vernon, Los Angeles, Calif. At the left is shown the 6"x8" L.B. saw. Among other modern features, it offers infinite hydraulic feeds; hydraulic lift on return stroke and selfcompensating, flexible, constant pressure feeding. The saw frame rises hydraulically to highest point on completion of cut. A graduated vise is provided with 45° swivelling jaw. (Jan. BB p. 324.)

POWER HACK SAW—Sales Service & Mfg. Co., 473 N. Cleveland St., St. Paul, Minn. A sturdy, high duty Keller unit furnished complete with a cabinet base, built in coolant tank and pump in cabinet base as shown at the right A special built-in feed control regulates blade feed pressure for light or heavy work. Two cutting speeds are provided. (May BB p. 204.)





FRICTION SAW—Kling Bros. Engrg. Works, 1300 N. Kostner, Chicago, Ill. At the left is shown a Kling hydraulic feed unit available in 36" and 48" down stroke with main motor sizes of 40 to 75 hp. Features include high rim speeds, simplicity of saw change, constant parallel, plane of saw motion and elimination of end motion in swing frame. (June BB p. 252.)

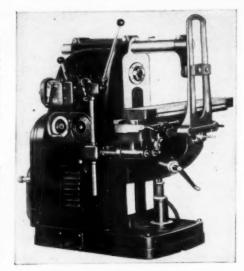


Write to SOSSNER 225 Centre St., N.Y. or 26 B'way, Lynbrook, N.Y.

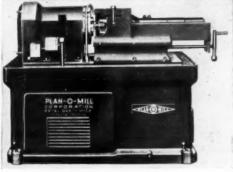
MILLING MACHINE — Simmons Machine Tool Corp., 1725
N. Broadway, Albany, N. Y.
This No. 1-A micro speed machine was designed especially for rapid production of small parts. The micro speed drive unit gives a very flexible range of spindle speeds. (April BB p. 294.)



PLAN-O-MILL — The Plan-O-Mill Corp., Royal Oak, Mich. A new refinement in the Model 3 shown at the right involves use of a G-E Thy-Mo-Trol feed control. This provides an infinite and stepless range of feed, both into and around the work by regulating flow of current to feed motor. (July BB p. 248.)



MILLING MACHINE—Machinery Mfg. Co., 1915 E. 51 St., Vernon, Los Angeles, Calif. The No. O horizontal machine shown at the left embodies several refinements and improvements. The bearing assemblies now include labyrinth housings for spindle bearings. Double rows of bearings on cross and longitudinal lead screws replace the single rows formerly used. There are many other innovations. (May BB p. 266.)





MD-2828-A Pit Type Convection Furnace—Cover in Operating Position.

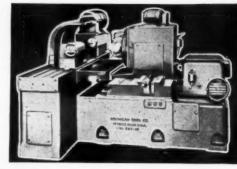
SEND FOR BULLETIN HD 1041

alloy shield between the heating elements and the work container.

# HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HETHER TYPE ELECTRIC EXCLUSIVELY
MILWAUKEE, WISCONSIN

GEAR FINISHER — Michigan Tool Co., 7171 E. Mc-Nichols Rd., Detroit, Mich. Machine shown at right is typical of the 862 series of gear finishers. These are suitable for finishing gears used in speed reducers, machinery of various types, large engines, turbines, etc. (Dec. BB p. 344.)



MILLING MACHINE—Lincoln
Machine Specialty Co., 135
South LaSalle St., Chicago, Ill.
A rugged and sturdy mount designed for use with any of the
modern high speed milling attachments. It is unusually
massive and rigid, weighing
without the head 2300 lbs. Table
is 10x42" permitting cuts up
to 30" long. (Dec. BB p. 275.)

#### DOUBLE END PACING AND CENTERING MA-

CHINE—Snyder Tool & Engrg. Co., Detroit, Mich. The heavy duty machine shown at the right has been developed in standard sizes that will take work lengths ranging from 12 to 20"; 20 to 28"; 28 to 36" and 36 to 44". It comprises 2 units, each equipped for milling and centering. (Dec. BB p. 242.)





# .. TRY IT on Your Own Work . . . See how much Better it Solves Your ABRASIVE DISC PROBLEMS

MARVEL is just the kind of Abrasive Discs you need to speed up vital production in your plant! A tough, fast-cutting disc that WON'T FILL UP. MARVEL abrasive discs are the perfected result of years of experiment. Sharp cutting Aluminous Oxide grit is firmly bonded to a chemically treated, super-pliable, genuine FIBRE back, with a RESIN COATING that grips every abrasive grain like a vise, will not heat up or soften in high speed service and consequently WON'T LOAD UP with dust and cuttings. RESULT: a longer life of high efficiency, reduced costs, fewer stops for cleaning and obanging.

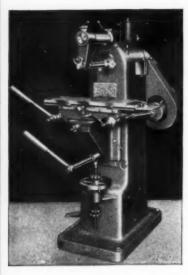
MARVEL ABRASIVE DISCS are being used by some of America's largest industries and in thousands of smaller plants. Made in all sizes of grif from 16 to 320. ASK TODAY FOR SAMPLE MARVEL DISC without cost or obligation. Prove MARVELS right in your own plant under your own working conditions.

## **FIBRE ABRASIVE CORPORATION**

# MARVEL

1133 E. 74th Street Chicago, Illinois

Abrasive GRINDING DISCS

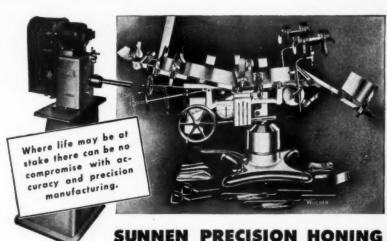


MILLING MACHINE — Wigglesworth Machine Tool Co., 191 Bent St., Cambridge, Mass. This No. 3 hi-speed small parts milling machine with auxiliary power feed has a Timken Bearing Spindle supplied with No. 40 standard milling machine taper. Table feed may be by hand or power. Table working surface is 7"x20". There are 6 speeds and 6 power feeds. (July BB p. 308.)

MULTI - MIL-LER-U.S. Tool Co., Ind., Ampere (East Orange), N. J. These machines are offered as high production precision units which permit milling to close limits even with unskilled labor. They are adaptable to climb milling, milling to depth, rotary and index milling, step milling, spur gear cutting, automatic cuttingoff, etc. Also may be used as standard hand millers. (March BB p. 230.)



VERTICAL MILLER — Kent-Owens Machine Co., 968 Wall St., Toledo, Ohio. This unit is built especially for rapid performance of vertical milling operations on small parts. Has infinitely adjustable hydraulic table feed with full automatic cycle. Ten spindle speeds are provided, ranging from 115 to 300 rpm. There are no gears in spindle drive. (Oct. BB p. 252.)





"Strict alignment maintained between two holes."



Diesel Engine Fuel Injector Cylinder
"So accurate that a piston can be
fit within .00005 inch."



of honing is used to secure a high finish and accuracy



Inner Bearing Ring "Accurately removes last 'tenth' of stock."



Hordened Steel Geors. Haning user to remove any distortion after hard ening and to selectively size the general to wildow diameters.



Airplane Engine Parts accurately haved to a super-smooth finish,

# assures accurate, dependable operation of Wocher Major Operating Table

The hydraulic cylinder and valves of this famous operating table used by the Army and Navy are precision honed by the Sunnen method to obtain accurate, dependable performance.

This is just one more example of the hundreds of ways in which the Sunnen "MA" Precision Hone is serving industry in our all-out war effort.

## Put Sunnen Honing to Work in Your Plant

The "MA" is fast! Its accuracy conserves vital war materials, assures absolute interchangeability of parts. Low in cost, economical to operate.

Wide Range — handles any internal diameter from .185" to 2,400".

Easy to Operate — workers in 'teens — even girls—can be trained to handle jobs in "tenths" in a few hours.

No Fixtures Needed — work held in hands. Relieves big internal grinders for other jobs.

### Let a Sunnen Engineer Check Your Jobs!

We'll gladly have a Field Engineer check your grinding or honing jobs in your plant with our "MA." Or write for free bulletin giving complete information.



Sunnen Awarded Army-Navy "E"

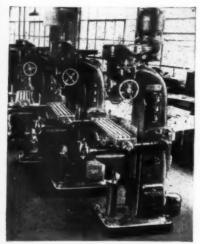
for its production of having equipment being used throughout industry in the manufacture of vital war materials.

SUMMEN

SUNNEN PRODUCTS COMPANY, 7935 Manchester Avenue, St. Louis, Missouri

Canadian Factory: Chatham, Ontario

VARI-ANGLE MILLING MACHINE—Shields Mfg. Co., Inc., 38-09 24th St., Long Island City N. Y. A versatile heavy duty machine adaptable for a wide range of vertical or horizontal milling operations. To change angular direction, spindle locking nose is loosened and head may be swung into new position by turning worm handle. Direct reading dials indicate angular position of head. (Jan. BB p. 228.)



VERTICAL MILLING MACHINE—Sommer & Adams Co., 18511 Euclid Ave., Cleveland, Ohio. The No. 1 Cleveland shown above offers a longitudinal capacity of 18", cross feed of 8" and 16" vertical feed. Table working surface is \$x32". Twelve table feeds are available, Likewise twelve spindle speeds. (Jan. BB p. 264.)



HAND MILLING MACHINE—Jefferson Machine Tool Co., 700 W. Fourth St., Clncinnatl, Ohio. Model 109-F quick acting hand lever feed—levers provide longitudinal feed of 8" and cross feed of 3". Working surface is 14½ by 4%. Four spindle speeds are provided. (Jan. BB D. 296.)



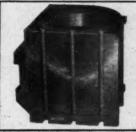


CHEEK THUSE ADVANTAGES OR BLANCHARD ORINDING

- \* Production
  Adaptability
  - Fixture Saving
- \* Operation Saving
- \* Material Saving
  - Fine Finish
- Flatness
- \* Close Limits



# "PUT IT ON THE BLANCHARD"



Semi-Steel Stock per side 1/8" Limits ± .005" square .001" to .0015" in 16" No. Sides 6 1 piece (6 surfaces) 1 hour and 35 min.



The shaper Table, 15½" x 16" x 16", illustrated here, is an excellent example of large, heavy work which may be ground with ease on a Blanchard No. 18 Surface Grinder with 6-inch extended column. These tables come to the Blanchard as rough, semi-steel castings. Six sides are ground, ½" stock being taken off each side.

MACHINE COMPANY
A STATE STREET, CAMERIDGE, MASS.

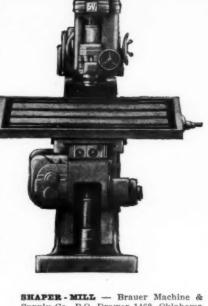
Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.



40, 5-V VERTIMIL — Ekstrom-Carlson & Co., 1300 R.R. Ave., Rockford, Ill. This unusual machine offers a ram type head; a swivel head; a sliding spindle; a swivel table and a 4-way power feed mechanism. In addition, it provides an unusually large capacity, allowing for a wide range of potential uses. (Jan. BB p. 290.)

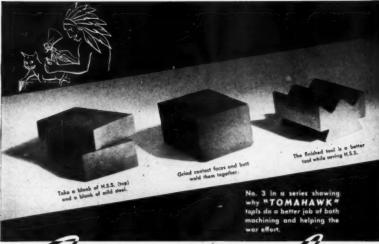
MILLING MACHINE—Wigglesworth Machine Tool Co., 191 Bent St., Cambridge, Mass. The No. 3 small horizontal milling machine is said to combine the usual features of the conventional hand miller with the ruggedness and accuracy of a larger machine. Six different rates of power longitudinal feed of table are provided. (Jan. BB p. 312.)





SHAPER - MILL — Brauer Machine & Supply Co., P.O. Drawer 1469, Oklahoma City, Okla. Any shaper 20" or over, may be converted into a versatile milling machine with the new attachment shown below. The conversion may be made speedily for it involves the mere bolting of the attachment to head of shaper ram. (Oct. BB p. 360.)





# Putting skin on a lat ....or on a Tool....

Just as there is more than one way to skin a cat, so there is more than one way to save critical tungsten and still make better tools.

There is a total of less than 2 per cent of critical tungsten in the complete TOMAHAWK tool type\* shown at the right. The reason: it has been fabricated by electrically welding High Speed Steel to mild steel, prior to machining, heat-treating, and grinding. The net saving of tungsten usually runs 50 to 75% as compared with tools of solid H. S. S.

The TOMAHAWK tool shown is 'hard' where hardness is required (at the cutting edges), and is 'tough' where toughness is important (at the dovetail).

Perfection of welding and heat-treating techniques have been carried to such a point today that failures of such tools at the weld are virtually unknown. Thousands of electrically welded composite steel TOMAHAWK tools are now in use in war production industries.

\*Genesee produces a complete line of cutting tools, including H.S.S., carbides, etc. Send for "streamlined" catalog No. GT-42-Am.

# GENESEE TOOL COMPANY

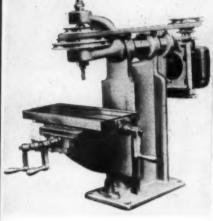
FENTON, MICHIGAN



HORIZONTAL-VERTICAL MILL—Fray Machine Tool Co., 501 W. Windsor, Glendale, Calif. This No. 9 is an all-purpose milling machine particularly suited for toolrooms and shops having a wide variety of operations to perform. For horizontal milling the turret head is reversed and the vertical attachment swung out of the way. (Oct. BB p. 374.)



BENCH MILLING MACHINE
Duro Mfg. Co., 800 E. 61st St.,
Los Angeles, Calif. This sturd;
unit shown at the left is said to
be equally 'adaptable to the toolroom and to high speed production
lines. Spindle is carried on precision taper roller bearings, Vertical travel of table is 7" longitudinal 8" and transverse, 5". Four
spindle speeds are provided. (July
BB p. 323.)



VERTICAL MILLER—Blank & Buxton Machinery Co., Jackson, Mich. The index vertical machine, shown at the right, provides feed to the spindle. The head can be set at any angle up to 90° either way. Piece shown in vise has one hole with counterbore straight thru and the other at 45°. Speeds sufficiently high for small end mills and sufficiently slow for ordinary jig borers are said to be provided. (April BB p. 190.)





# Make your Disc Grinders produce more

with GARDNER ABRASIVE DISCS IN THESE days, when every gunce of productive capacity is needed more than ever before, new

equipment is not the ONLY solution. The Production Official who strains his present facilities to the utmost - who gets every last bit of efficiency out of an old machine or tool - is a valued contributor to the War Effort, and to the output of his company, as well.

There's just ONE WAY to make sure that your Disc Grinders hit the top of the production cycle - and STAY THERE.

The use of modern, heavy-duty Gardner WIRE-LOKT Abrasive Disc and Wheels, will guarantee that result.

For these long-lived, free-cutting abrasives, available in an almost unlimited variety of grades, grains and bonds, permit the selection of the IDEAL disc for YOUR work, whatever it may be. And an experienced Gardner Abrasive Service Man is conveniently located to help you make the selection, and to insure prompt service at all times.

If you must wait many months for NEW Grinders. get MORE out of your present machines - TODAY!

GARDNER WIRE-LITHT ABRASIVE DISCS and WHEELS speed production on ALL Disc Grinders

GARDNER - GRIND

MACHINE COMPANY

36 East Gardner Street . . . . Beloit, Wisconsin, U.S.A.

SEMI-AUTONATIC MILLER—Snyder Tool & Engr. Co., Detroit Mich. Clearances for articulæded connecting rods are milled on this new semi-automatic unit. Roughing and finishing are performed on this machine, which will handle either solid or split type rods. The unit is shown below. (April BB p. 186.)

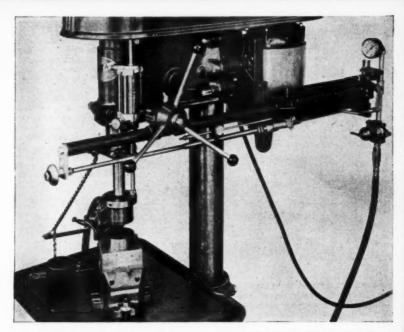


MILLING MACHINE—C. C. Bradley & Son, Inc., Syracuse, N. Y. Machine shown at right is a new design of the Briggs production type machine. Features include hydraulic table feed, new type No. 40 NMTBA spindle, motorized unit drive providing 8 spindle speeds, lateral calibrated adjustment of spindle, calibrated table elevation, spindle reverse, etc. (Feb. BB p. 215.)



VERTICAL MILL-JIG BORER-Linley Bros. Co., 11 Montauk St., Bridgeport, Conn. Table size is 7" x 17 1/4" with 3 T-slots, Longitudinal travel is 10", cross travel 6". Distance, table top to spindle nose is 11 1/2". Movement of sliding head is 8". Eight spindle speeds are provided. Collet capacity is 1/2". (November BB p. 326.)





# Speed Up Production with Pneumatic Machine Tool Accessories!

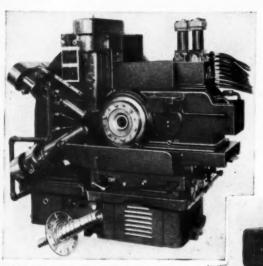
PRODUCTION ENGINEER: A casual glance at illustration might suggest to you or your men ideas which would result in speeding up some operations many hundred percent. Thousands have been sold. Many working round the clock. Many operated by women. All doing their part on SPEEDUP of Government work.

This installation shows Model 4 AV Air Vise, Drill Press Feed and Hydro-Check installed on a Delta Drill Press, all synchronized to work automatically. Vise holds steel cylinder firmly in place for end finishing. Drill Press Feed is automatically advancing cutting tool. Hydro-Check is in position to check speed of power advance just before tool contacts work. Cutting tool is automatically advanced and retracted under predetermined distance and power thrust. Tool can be advanced by hand before initiating power advance if so desired.

#### HYDRO-CHECKS ARE USED IN CON-JUNCTION WITHDRILL PRESS FEEDS TO:

- A-Avoid "coning out" of work pieces and "hogging breakage" of drills by checking the speed of power advance just before the drill breaks through the work piece.
- B— Control the rate of reamer advance in reaming operations.
- C— Take the shock off drills (especially small drills) by checking the speed of power advance just before the drill contacts the work.

# NEIL BURGESS COMPANY EN-BE-CO MELROSE, MASS.



THREE SPINDLE ROTARY MILLER—Snyder Tool & Engrg. Co., Detroit, Mich. Machine shown at the left is used in milling an undercut in a circular shoulder section of a turned propeller shaft hub to produce 6 elevated rest pads. Entire operation is automatic except for throwing a lever between first and second cycles. (Nov. BB p. 276.)

RADIUS CONTOUR MILLER—Snyder Tool & Engrg. Co., Detroit, Mich. A semi-automatic machine for radius contour milling the bolt bosses on connecting rod caps. It features 3 spindles and 3 revolving fixtures for machining 3 parts at one time. Machine is shown at the right. (Feb. BB p. 152.)



#### MILLING SHELL STATION NOTCHES

-Kent-Owens Machine Co., Toledo, Ohio. At the left is shown a multiple spindle head for simultaneously milling a number of staking notches and shell noses. The 5 spindle head mills all 5 staking notches in a typical shell at the same time. Fixture is designed so that shells are rolled on to it from an adjoining conveyer, completely notched and then rolled back on the conveyor. (Oct. BB p. 367.)

# "We need a Super-Furnace, Mr. Nordenson"



MAHR Combination Forging and Welding Furnace, like illustration or can be made in wide hearth or car type. Special sizes or types can be designed.

..."ONE THAT
WILL STAND
WELDING HEATS
UP TO 3300°"

This good customer of ours, who for many years has depended on MAHR Performance-ability, had been trying to make a MAHR Forging Furnace do double duty at the extreme heats he required for welding. So he put his problem up to Mr. A. J. Nordenson, our Executive Engineer, who watched the welding operations in his plant and soon saw what was needed. "We'll build you a 'Super' Furnace, to stand the welding heats you use and also handle forging work," he told the customer.

"The difficult we do at once—the impossible takes a little longer"—might well be the battle-cry of MAHR Engineers. If you have a heat treating "nut" that's hard to crack—consult MAHR for any size or type of heat processing equipment, from bench type to the largest car or continuous type. Wire, write or phone today!

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MAHR Standard Heat Treater. Made in many sizes and types.



MAHR No. 35 Portable Forging Furnace, for small forging operations and rivet heating. Vacuum fuel feed by compressed air—safe —very efficient.



MAHR Furnaces
For Every Heat Treating Need

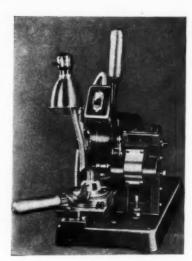
ANNEALING, CARBURIZING, BAKING, HARDENING, FORGING, DRAWING, STRESS RELIEF

Furnace Types: Other MAHR Equipment: CAR BOTTOM RIVET FORGES PIT PUSHER TORCHES ROLLER HEARTH BURNERS CONTINUOUS BLOWERS POT VALVES ROTARY SMITHING FORGES

Direct-fired, recirculating or radiant tube types for both HIGH and LOW temperature ranges. **SMALL HAND MILLER**—H. D. Rouse & Co. 2216 North Wayne Ave., Chicago, Ill. This hand miller for small parts is a high speed ball bearing motor driven bench machine suitable for light cuts in brass, aluminum and similar materials. Through use of special fixtures, the machine is capable of very high production. Spindle is adaptable so that small circular milling cutters or end mills may be used. (Oct. BB p. 361.)



VERTICAL MILLING HEAD — Machinery Mfg. Co. 1951 E. 51st St., Vernon, Los Angeles Calif. This unit is especially designed for use on the Vernon No. O milling machine. Milling head is equipped with special collets for quick ejection of cutters and tools. Four spindle speeds are provided. The 1/3 hp motor is ball bearing equipped. (Nov. BB p. 371.)





MILLING ATTACHMENT — Fray Machine Tool Co. 501 W. Windsor Rd. Glendale, Calif. The unit shown above is designed to speed manufacture of drill bushings. Through use of a traveling quill, the stepped recess in drill bushings can be milled to close limits on a production basis by semi-skilled operators. (April BB p. 302.)



THOSE old machines can be switched from liabilities to real blue-chip producers without hocus pocus or black magic!

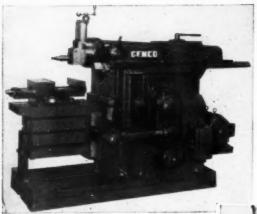
Simply drill four bolt holes and mount a correctly-sized Given Vari-Speed Drive. You'll immediately get:

30% more spindle speeds No sacrifice in original slow speeds Nocessary r.p.m. for efficient use of carbide tools Rapid variable speed control with no steps or gaps Efficient, constant surface speeds on facing operations, increasing or decreasing diameters.

Write for our bulletin and blueprints showing various bracket designs. Recommendations and cost estimates furnished upon receipt of your machine tool list. Write today!



GIVEN MACHINERY CO., 3857 SANTA FE AVENUE, VERNON, LOS ANGELES, CALIF.



MULTI - PUBPOSE SHAPER—General Engineering & Mfg. Co., 1524 South 10th St., St. Louis, Mo. These shapers are available in various sizes ranging from 16" to 24" stroke and are offered in 3 types—Plain, Production, and Universal. There are numerous refinements and advanced features. (March BB p. 212.)

MILLING MACHINE—Aircraft Machinery Corp., Burbank, Calif. At the right is shown the armor milling machine. According to the maker, this machine with hydraulic feed, utilizes a combination of horizontal spindle and a vertical spindle capable of any angle, mounted on a single rigid turret, rotating a full 360°. (May BB p. 188)





LOCK FORMER ROLLING MACHINE—Lockformer Co., 4613 Arthington St., Chicago, Ill. Model S-10 shown at the left is said to shape metal strips as shown in one operation and to accommodate 2 sizes. Flat strips of 20 gauge sheet metal are fed through rolls on either side of forming head. The strips emerge from the forming head in the design shown, on one pass through a machine. (Aug. BB p. 224.)



ely ground and of ample strength to in-

sure long life. The Index Pin of hardened steel is easily operated by lifting the knurled knob at top of turret body. Center post of very heavy construction and equipped with lock nutflatted to allow for a solid connection to the top of compound. Index plate equipped with ten stops allowing for ten different tool settings.

WRITE FOR FOLDER GIVING DETAILS.

# OMATIC MACHINE & TOOL

AUBURNDALE.



SHAPER — Porter-Cable Machine Co., 300-3 Exchange St., Syracuse, N. Y. The compact 7" machine shown at the right is self-contained with motor and speed change control in floor pedestal. Ram travel is 7%", operating at any speed from 64 to 175 strokes per minute. (June BB p. 226.)



SHAPPE—Automotive Maintenance Machinery Co., 2106 Commonwealth Ave., No. Chicago, Ill. The Ammco 7" precision shaper shown at the left is also available mounted on a portable cabinet. The features include quick adjustments of stroke, feeds, ram position, tool head, speeds, table height and table support. Tool head is adjustable and graduated to 90° for angle work. Countershaft has 4-step V-pulley. (May BB p. 242.)



SHAPES—The Sales Service & Mfg. Co., 473 N. Cleveland Ave., St. Paul, Minn. This 8" hy-duty shape-rite machine is now available with a swivel table. Table is mounted on a special hevi-duty cross rall saddle and is graduated to a total of 180° or 90° at either angle and may be set to any desired angle. (June BB p. 287.)



SAFETY FEATURE Hands are kept away from under the wheel.

The C-66 is mounted directly on magnetic chuck and will accurately dress wheels to both male and female radii... without dismantling machine. For dressing wheels for grinding turning tools, the dresser is set at an angle equal to clearance angle of tools. The C-66 is the only radius dresser with this feature.



Long Wearing Chinel Point



Vee Ground Center of



.500 Male



.013 Male and Female Radius

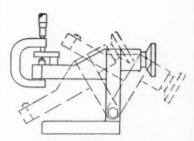


1800 and 900 Male Dressing

# NEW

# C-66 RADIUS DRESSER for Any Make of Surface Grinder

Accurate
Safe to Use
Thoroughly Practical



Setting diamond with micrometer for accurate radius.

PROMPT DELIVERY FROM FACTORY IN NEWARK.

**Prices** 

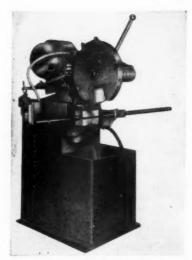
Without Diamond . . \$82.50 With ¼ k. Diamond 87.50 Send for New Catalog.

SCHULTZ & ANDERSON CO.,

109A EDISON PLACE. NEWARK, N. J. SEMI-AUTOMATIC SAW—Pines Engineering Co., 123 Main St., Aurora, Ill. The automatic saw shown at the right was developed especially to cut shell bands held closely to length, with end limits of plus or minus .0005". The machine can be used either with high speed steel blades or abrasive wheels and will cut steel or non-ferrous metals up to 3". A cam action chuck prevents slippage or rotation while saw is passing through piece. A free wheeling type clutch permits continuous operation. (March BB p. 294.)



METAL CUTTING SAW—J. D. Wallace & Co., 142 South California Ave., Chicago, Ill. The machine shown at the right has capacity for material up to 4" in thickness. Saw blades or 3/32" abrasive wheels are used, depending on material to be cut. Bars, sheets, extruded sections, metal moldings, tubing, casting sprues and many other forms are accommodated by optional table assemblies. (April BB p. 298.)



METAL CUTTING MACHINE—De Walt Products Corp., Lancaster, Pa. This machine is designed specifically for high speed cutting of round, square, or tube stock. It is recommended for 1½" diameter solids and up to 4" tubing. (Feb. BB p. 148.)



At your service...contact your Dearborn Gage Company Representatives in these key cities:



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Sterling Products Co., Inc. 121 N. Jefferson Avenue Chicago, Illinois

J. R. Stewart & Associates 918 University Building Syracuse, New York General Tool Sales Co. 3945 N. Broad Street Philadelphia, Penn.

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H. S. Kartsher 3411 Perkins Avenue Cleveland, Ohio Harley E. York 2900 Dixie Drive Dayton, Ohio

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WDEARBORN GAGE COMPANY

1) 22033 BEECH STREET - DEARBORN, MICHIGAN Friginators of Chromium Plated Gage Blocks



#### GAP GAGE GRINDER-

The Ny-Lint Tool Co., 1823 16th Ave., Rockford, Ill. In addition to use for precision grinding on gap and snap gages, this machine can be applied to a variety of other grinding services. (Feb. BB p. 270.)

#### INTERNAL GRINDER-

Abrasive Machine Tool Co., E. Providence, R. I. The IG Internal Grinder shown at the right is especially adapted for die construction work in connection with bullet and cartridge production. It will grind holes up to 12" diameter; has 8" longitudinal travel and 3½" spindle cross feed. (Nov. BB p. 271.)



#### CARBIDE TOOL GRINDER -

Standard Electrical Tool Co., 1954 W. 8th St., Cincinnati, Ohio. This type CCGA Grinder shown at the left is equipped with a 3 hp, 1150 rpm motor for use with an 18" diameter x 2½" face straight grinding wheel. Suitable flanges are furnished to accommodate this size wheel with 10" diameter hole. Outside diameter of wheel flange is 15" so actual wheel waste is but a 1½" thick ring. (May BB p. 284.)

# DOUBLE THE TOOL LIFE at Half the Tool Cost! WITH SUTTON MASTER FEED FINGERS AND INTERCHANGEABLE AND REPLACEABLE PADS

One master and different sets of pads will handle practically the full range of work on any machine, and worn out pads can be quickly and easily replaced in the original master. This cuts your tool cost as much as 80%. But, since the pads are separately hardened, to resist wear, and can be ground many times to restore size, they outlast ordinary one-piece feeders two or three times.

NO LOOSE PINS OR SCREWS——a lug on one of the pads engages a slot in the master.

COMPENSATION FOR WEAR—double angles on the sides of each pad can be ground down many times to restore hole size.

TAPERED FOR STOCK ENTRY—no jamming. QUICK, EASY PAD CHANGES—each master is furnished with a set of spreaders, one for each slot.

SELECTIVE HEAT TREATMENT—the master is spring-tempered, and the threaded end toughened, the pads are hardened for extreme wear-resistance.

COLLETS . MASTER COLLETS AND PADS FEEDERS . MASTER FEEDERS AND PADS PARTS AND ACCESSORIES for lathes . . . milling machines . . . and automatic screw machines .

# SUTTON TOOL COMPANY

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**SUTTON** 



COLLETS

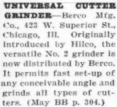
## CARBIDE TOOL GRINDER-

Hammond Machinery Builders, 1614 Douglas Ave., Kalamazoo, Mich. The "14" Hammond is available for wet or dry grinding. It is built in 2 models for cup wheels on both sides or cup wheel one side and straight wheel the other side. Tables are mechanically controlled. Angular setting of each table is quickly obtained by a hand wheel graduated in degrees. (March BB p. 194.)



#### DOUBLE END CARBIDE GRINDER -

Willey's Carbide Tool Co., 1344 W. Vernor Highway, Detroit, Mich. The grinder shown at the left is said to incorporate recent improvements for greater efficiency in free hand grinding of carbide tip and other tool bits. It is provided with coolant pump and pan for wet grinding. (Nov. BB p. 736.)







GENESEE ADJUSTABLE HOLLOW
MILLS ARE BREAKING PRODUCTION
RECORDS NOW JUST AS IN WORLD
WAR 1

Backed by 35 years experi-

Backed by 35 years experience our entire facilities are devoted to the manufacture of inserted blade Genesee ADJUSTABLE HOLLOW MILLS, Facing and Counterboring Tools and Special Production Tools.

Our standard line of Hollow Mills include 16 style and sizes from 0 to 2 inches; larger sizes upon request.

Our Engineering Department is always ready to serve you in your Production Tool problems.

Write for complete Catalog No. 42-H



MANUFACTURING CO., INC.

GENESEE PRODUCTION TOOLS



### CARBIDE WET GRINDER

- Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich. Antisplash guards for Models 10 and 14 Hammond carbide tool grinders are shown at the left. The guards are concealed and are close to the wheels and no hoods or shields are in the way. The hood is easily removed. Tables are mechanically controlled by a crank and worm tilting mechanism adjustable to any point between 15° above and 30° below horizontal. (July BB p. 325.)

#### DOUBLE END CARBIDE GRINDER-

Willey's Carbide Tool Co., 1344 W. Vernor Highway, Detroit, Mich. Model 24 shown at the right is said to include all recent advances that facilitate free hand grinding of tungsten carbide tipped tools as well as other types of tool bits. (Feb. BB p. 170.)





UNIVERSAL TOOL GRINDER — Machinery Mfg. Co., 1915 E. 51st St., Los Angeles, Calif. A sturdy and accurate grinder handling all types of tools, cutters, cylindrical work and internal jobs within its capacity. Centers swing 10½" dia. over table. Maximum longitudinal travel is 17¼". Maximum work length between right and left hand tallstocks is 16"—between headstock and tailstock, 13½". (Oct. BB p. 369.)



# Here's the Advantage of

STOW FLEXIBLE DRILL SHAFTS

# And Here's The Reason

Why One Aircraft Producer Has 4,000 Stow Shafts On Active Duty

YOU CAN'T BEAT STOW DEPENDABILITY! Pioneers of the flexible drill shaft, Stow for 67 years has developed and perfected this valuable extension that simply fits into your electric drill chuck. It's made to stand up under heavy-duty use for long, tough service. The protecting case is rugged and durable, with permanent-grip end-pieces... and the core is strong and long-wearing—as only Stow can make it! Look into all the possibilities STOW can offer you—write today for the new Stow Literature that outlines many new uses, gives all data!

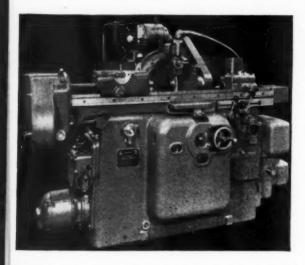
FOR STEADY SERVICE - SPECIFY STOW!

STOW MANUFACTURING CO., Inc. 30 SHEAR ST. BINGHAMTON, N. Y.

# STOW FLEXIBLE SHAFT MACHINES

Complete line of heavy-duty and junior portable models for grinding, filing, drilling, sanding, polishing, wire-brushing, etc. Takes the machine right to the job! Ask us about these production hustlers!



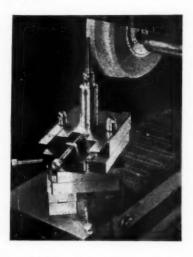


THREAD GRIND-EE—Jones & Lamson Machine Co., Springfield, Vt. The 6 x 3 6" universal thread grinder shown at the left is one of several machines of this type in the J & L line. All of these machines utilize electrical control. For a description of their operation see July BB p. 127.



COMPOUND ANGLE DRESSER—F. H. Robertson Co., Malden, Mass. The dresser shown at the right is recommended for use on all surface grinders. The makers claim that this close tolerance, dresser will dress included angles up to 180° at one setting. (Sept. BB p. 339.)

RADIUS DRESSER—Geo. Scherr Co., 122 Lafayette St., New York, N. Y. The Little Wonder Radius Dresser shown at the left is designed to speed up and simplify the dressing of grinding wheels for various types of grinding work. (March BB p. 256.)



# WARTIME SHOP RECIPES

for thread production





RECIPES - 140 pages of them - to help you get more accurate threads in production - with better taps, thread gages, thread milling cutters.

If your shop is producing threaded parts, you too should have one of these Shop Recipe books: the new "DETROIT" loose-leaf Catalog No. 22.

Write on your company letterhead.

# DETROIT TAP & TOOL CO.

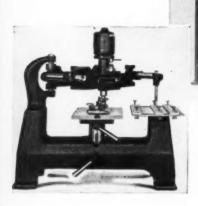
8432 BUTLER STREET, DETROIT, MICHIGAN, U. S. A.



#### UNIVERSAL TOOL & CUTTER GRINDER -

Covel Mfg. Co., Benton Harbor, Mich. The No. 22 Covel shown at the left is a fast, flexible, precision grinder for today's tools. Longitudinal travel of table is 24"; vertical movement of grinding wheel spindle is 7½"; cross movement of saddle is 8"; swings work 10¾" in dia. (Dec. BB p. 266.)

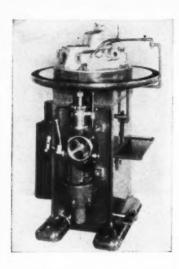
SUPERFINISHING — Foster Division, The International Machine Tool Corp., Elkhart, Ind. Recent improvements have been made in the Foster 4x18" general purpose superfinishing machine and a new and longer 4x 36" model has been added to the line, (Dec. BB p. 346.)



PANTOGRAPHIC UNIT — H. P. Preis Engraving Machine Co., 157-A Summit St., Newark, N. J. Machine shown at left is an improved pantographic unit for rotary engraving electrical marking and acid etching. Separate heads, quickly interchangeable are used for the 3 classes of work, and the ballbearing mounted pantograph provides reductions from 1.8 down to 5 to 1. (Jan. BB p. 236.)



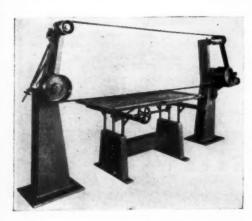
INDUSTRIAL AIR LINE EQUIPMENT 1786 E. 27TH STREET . CLEVELAND, OHIO



TAP RECONDITIONER—Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich. This versatile unit shown at the right combines facilities for chamfering, spiral pointing and point polishing. Taps of from 2 to 7 flutes may be handled through provision of an indexing drum. (April BB p. 226.)

SPOT PACING MACHINE—Taft-Peirce Mfg. Co., Woonsocket, R. I. This machine shown at the left is designed for counterboring or facing bosses through which a hole has been drilled, which because of an obstruction, is impossible to counterbore on a drill press. (Jan. BB p. 226.)





ENDLESS BELT SANDER

—Jefferson Machine Tool Co., 700 W. Fourth St., Cincinnati O. The machine shown at the left facilitates finishing operations on large flat as well as concave or convex surfaces. The table travels 36" backwards and forwards on ballbearing rollers and is easily moved while operator applies pressure to the flexible belt with block or pad. (Jan. BB p. 240.)

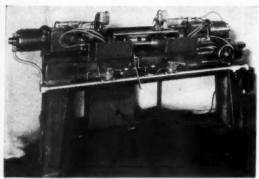
#### Cincinnati



Write for Bulletin 152-B describing all Hypro Machine Tools.

#### The CINCINNATI PLANER Ca.

CINCINNATI OHIO USA.
PLANERS • PLANER MILLERS • VERTICAL BORING MILLS



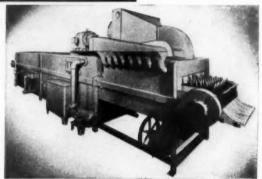
## BARREL RECENTERING MACHINE—W. M. Steele Co., Worcester, Mass. The machine shown at left is designed to recenter (for turning) both ends of gun barrels after drilling and rough reaming of bore. Models are available for .3 and .5 bore and barrel lengths

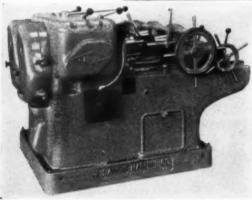
from 16 to 46". (Apr.

BB p. 276.)

#### SHELL CLEANER -The Alvey-Ferguson

Co., 777 E. Disney St., Cincinnati, O. Machine shown at right is especially designed to remove grease and chips and dry 20, 37 or 40 mm shells. Automatic ejection of shells is a useful feature. (June BB p. 278.)





## SHELL BORING MACHINE—Landis Machine Co., Waynesboro, Pa. Machine shown at the left involves a new Landmaco adaptation for production of war material. The Lanco die heads ordinarily supplied, are replaced with a special adaptor supporting a boring tool of the replaceable bit type. Special round serrated grips are employed for supporting the work in accurate alignment. In addition, a special work support or cradle is employed immediately in back of the carriage front, to align work with work grips. (May BB p. 224.)



One of America's prominent Manufacturers recently was able to start work immediately on a heavy Emergency Contract because he had a Mill Supply Distributor who specialized in helping customers to break down emergencies.

Specifications called for holes of "out" diameter and only special drills could produce them -drills that no manufacturer could deliver within weeks.

Working with the Purchasing Department, the Distributor finally reported: "take the contract and line up production as fast as you can. I know

where these millimeter drills can be had-plenty of them to keep you going until the factory itself can fill your order."

The contractor filled the War

iob on schedule-thanks to the Distributor who knew his way around and had made bis organization a helpful, friendly part of the Manufacturer's, Think of your Distributor today as a trustworthy purchasing and expediting assistant, trained in emergency to contact many sources of supply and to locate somewhere the items you need, if they can be had at all.

Supply Houses of the highest type have served for years as Distributors of Cle-Forge High Speed Drills and Peerless High-Speed Reamers. Please accept our own confidence in them as ample

> reason for our commending them to you-for they are located all over America and have been our Representatives for many years.

This incident is typical of the real services that many Mill Supply Distributors are



d May 23, 1942 Supercoded July 13, 1943



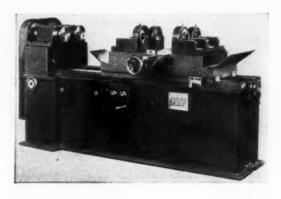




CLEVELAND" DISTRIBUTORS EVER ARE READY TO SER

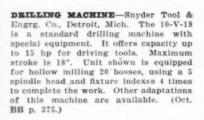
## CARBIDE - DIAMOND BORER — The Giern & Anholtt Tool Co., Detroit, Mich. The model 2-B machine illustrated has a table travel of 40" spindle center is 9" above table. Floor space required is 40"x106" and weight is 6,000 lbs.

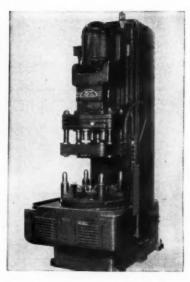
(May BB p. 292.)





BROACHING MACHINE—Colonial Broach Co., 147 Joseph Campau, Detroit, Mich. This new dual-ram series designated VAD includes 11 sizes, ranging from 3 tons and 36" stroke up to 25 tons and 66" stroke. (April BB p. 184.)







Hopper for Thread Rolling Equipment

Hopper feeds, as designed by Interlakes specialists, are serving many war plants... speeding production, cutting costs, and facilitating smooth production operations. Backed by years of "know-how", Interlakes Hopper-Feeds deliver consistently and stand up under the gruelling pace of all-out production. In addition, you are protecting yourself against accidents and inexperienced help.

If increased production with present facilities is your problem, send us details for free analysis and suggestions on how Interlakes Hopper-Feeds can supply your needs.

#### INTERLAKES ENGINEERING CO.

Transportation Bldg.

Detroit, Mich.

Hoppers Individually Engineered To Fit Your ---

SCREW MACHINES
THREAD ROLLERS
DRILL PRESSES
TAPPING EQUIP'T
MILLING MACHINES
SAWS...etc.



Hopper for Screw Machine



TAFFER — Brand Tool & Supply Co., 334 N. Vermont Ave., Los Angeles, Calif. The M & L Tapper shown at the left is equipped with a 36" high base and coolant system. It is said to tap holes up to \%" in chrome moly steels and to \%" in s of ter metals.' (Sept. BB p. 318.)



ENURLING MACHINE—Wm. A. Force & Co., 216 Nichols Ave., Brooklyn, N. Y. The unit shown above is semi-automatic with a production rate of 1,000 pieces and over, per hour. Machine illustrated is tooled for speedily knurling 20 mm shells. Similar units may be assembled for knurling other cylindrical pieces ¼" to 3" dlameter. (Nov. BB p. 264.)



#### AIR OPERATED CHUCKING DE-

VICE—Anker-Holth Mfg. Co., 332 S. Michigan Ave., Chicago, Ill. Drill presses as well as lathes and vertical milling machines may be converted into production machines through use of such air operated chucking devices as shown at the left. This set-up employs a combination air cylinder and air operated 3-jaw universal chuck, used in performing internal machining operations on 40 mm high explosive shells. (Dec. BB p. 317.)

TAPPING MACHINE — Cleveland Tapping Machine Co., Cleveland, Ohio. The model unit shown at the right is lead screw controlled and is said to be 100% automatic. It is equipped with a 4-speed V-belt drive. (Sept. BB p. 248.)





Photo above shows Jefferson Turrets on 161 lather

## Convert YOUR ENGINE IN 15 SECONDS

5 Tool-Tail Stock Turret

PAT. PENDING

Yes, its as easy as that! You simply attach the Jefferson Tail Stock Turret, the Jefferson Tool Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.

The productive capacity of these machines will be more than doubled in many instances because there will be available at all times NINE DIFFERENT TOOLS.

With these three JEFFERSON time saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc. without stopping the lathe or changing tools. THE JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24° swing.



Forward, backward, up down, right, left, at any desired angle. Does thework of 2 men. Delivery 20 days.
TURRET DELIVERIES IN 6 DAYS





Write for further details, also literature on the Jefferson Precision Milling Machine, Milling Machine Dividing Heads, Vises, Swing Frame Grinder, Endless Belt Sander, Foundry Riddle.

JEFFERSON MACHINE TOOL CO.

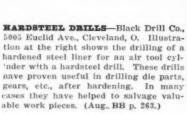
700 W. FOURTH ST.,

CINCINNATI, OHIO

TAPPING MACKINE — Pacific Tool & Supply Co., 342 N. Vermont Ave., Los Angeles, Calif. This precision tapping machine shown at the right has a capacity up to %", including %" pipe. It is claimed to meet Army, Navy and other government specifications and is recommended for any type of manufacturing where Nos. 3 and 4 specifications are demanded. (Feb. BB p. 224.)



Bakewell Mfg. Co., 2427 E.
Hakewell Mfg. Co., 2427 E.
14th St., Los Angeles, Calif. A radial tapping machine recommended for plants if precision tapping on a production basis is necessary; particularly for large and bulky pieces of work. (May BB p. 286.)



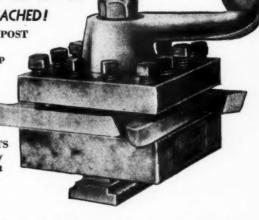


SAVE TIME with attachable Lathe

TURRETS
INSTANTLY ATTACHED!
3' SQUARE TOOL POST
TURRETS fit:
9' So. Bend Workshop
10' Atlas

41 SQUARE TOOL POST TURRETS are made so that they can be machined to fit larger lathes.

10" Logan



3" TURRET—Body is 3' square steel, case hardened and drawn to a mottled blue. Openings in body will accommodate tool stock up to %' square. Indexes in 4 positions. Made with same degree of accuracy and high quality of \$25.00 FOB, N. Y. materials as 4" Turret.

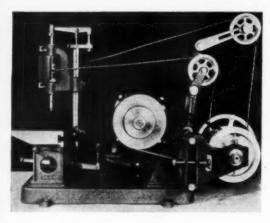
4" TURRET—Sold with large unfinished base so they can be easily machined to fit all 12" to 18" swing lathes. Has body of case hardened steel 4" square. Takes tools up to ¾" square. Will transform an engine lathe into a turret lathe with indexing in four positions.

\$49.50 FOB, N. Y.

#### IMMEDIATE DELIVERY!

We carry a complete line of H. S. Drills, Milling Cutters, Lathe Tools, H. S. and C. S. Taps and Dies, Drill Chucks, Lathe Chucks, Files, Special Taps and Dies, etc.

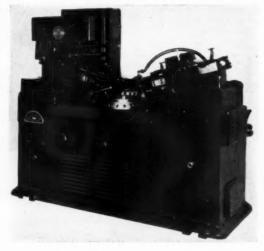
CENTER TOOL Machine Shop Equipment CO. 153 CENTRE STREET, N.Y.



SUPER SENSITIVE DRILL - The Edward Blake Co., 634 Commonwealth Ave., Newton Centre, Mass. At the left is shown a super-sensitive drill press for extremely small drills and other tools. Standard speed range is from 3,000 to 23,000 rpm in 8 steps. This gives the proper surface speeds on drills from .004 or smaller to 1/16" dia. (Nov. BB p. 317.)

SPECIAL DRILLING MACRINE—Snyder Tool & Engrg. Co., Detroit, Mich. The special hydraulic drilling machine shown at the right is used to drill oil holes diagonally through the trunnions of a reduction gear carrier ring. (Aug. BB p. 205.),





BENCH DRILL PRESS—Morton Aircraft Corp., 3225 Harney St., Omaha, Neb. Height is 35"; table travel 10"; spindle travel 4%"; table surface is 10" x 12"; standard speeds are 470, 780, 1300 and 1950 rpm. (July BB p. 339.)





#### CONSTANT HIGH SPEED GEARED HEAD GRINDER

No tool is faster, more efficient or more economical for those "hurry-up", War Production metal finishing jobs than a MALL Geared Head Grinder. They are free from "power drop" due to leaky or overloaded air lines. They operate independently of all other tools and provide constant working speeds from 3450 to 4500 r. p. m. on 60 cycles. The 6 interchangeable tools for Grinding, Disc Sanding, Wire Brushing, Drilling, Polishing and Buffing can be changed in a jiffy.

Available for Victory Production with full ball bearing dust and vaporproof or ventilated type motor and caster base or overhead trolley mounting.





#### FLEXIBLE SHAFTS FOR REMOTE CONTROL and POWER TRANSMISSION

GEARED HEAD 3 H. P. Other Models 34 H.P. to 3 H.P.

Furnished with Metallic Housings; also rubberized Fabric Housings—specially engineered for all industrial, Aircraft and Automotive installations such as recording instruments, Electric, Pneumatic and Gasoline Engine Power Tools, Engine Tachometers, Fuel Pumps, etc. Write for Engineering data TODAY. Our engineers are at your disposal.

When writing please submit full information regarding installation.

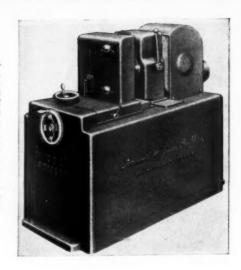
#### MALL TOOL COMPANY

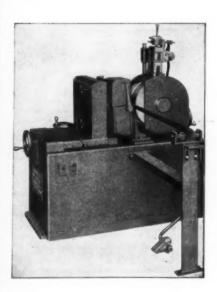
7742 South Chicago Avenue

Chicago, Illinois

CYLINDRICAL POLISHER-

Hammond Machinery Builders, Inc., 1614 Douglas Ave. Kalama-200, Mich. This od cylindrical polishing machine is capable of handling 4" to 9" shapes, rods and tubes. Range of feed is given as 0 to 50' permanent, forward or reverse. Machine is claimed to permit an inexperienced operator to obtain quality finishes at high production rates. All parts are carefully guarded and readily accessible. Wheel cover may be removed quickly for changing wheels and abrasive belt. (April BB p. 292.)





CYLINDRICAL POLISHING MACHINE — Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo Mich. An od finishing machine with a wide variety of application in war production. The machine illustrated shows but one of a number of ways in which it can be arranged, using for the polishing member a special wheel with auto-doper, adapted to the particular work. Capacity is \(\frac{4}{2}\)" to 9" od. (Nov. BB p. 362.)

### Gain on Grinding Time!

Here a stamping
die is being ground to
close tolerance, which a leading
tool manufacturer states is common
practice on his Covel No. 15
Surface Grinders.



## PROMPT DELIVERY on the COVEL No.15 Hand Feed Surface Grinder!

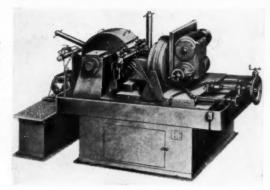
Covel's intensive production makes **prompt** delivery to war industries possible. This high-speed, easy-to-operate surface grinder is a low-cost production weapon which you can put into the hands of your operators now!

Write, wire or phone today for detailed inform ationcontained in Covel's MT-13 Bulletin.



#### CENTERLESS GRIND-

ER-H. Leach Machinery Co., 387 Charles St., Providence, R. I. The Model M-2 Zephyr is a sturdy and accurate unit. Grinding wheel is 20" in diameter 4-8" face, 12" hole. Regulating wheel is 12" in diameter, 4-8" face, 6" hole. Grinding wheel speed is 3,000 rpm. (Dec. BB p. 245.)



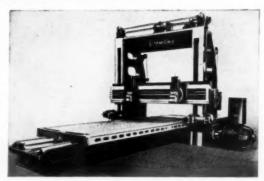
-Minnesota Mining & Mfg. Co., 902 Faquier Ave., St. Paul, Minn. The husky unit shown at the left is designed for speedy grinding of steel and alloy steel plates. strip, tubes, bars, and other work where removal of a considerable amount of metal and maintenance of smooth, even surfaces are necessary. (Dec. BB p. 253.)

BELT SWING GRINDER



#### HEAVY DUTY PLANER

-Simmons Machine Tool Corp., 1725 N. Broadway, Albany, N. Y. Special features of machine shown to the right include forced feed lubrication of ways, herringbone gear drive, power rapid traverse to all heads, double length enclosed bed and double plate box table. Width between housing is 124". Height under bridge 1101/2", under cross rail 97 1/4". (June BB p. 186.)



## on the PRODUCTION of EXTERNAL and INTERNAL THREADS



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7'; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

#### The James COULTER Machine Co.

BRIDGEPORT

CONNECTICUT

U.S.A.



#### SWING GRINDER

— V o n n e g u t Moulder Corp., 1805 Madison Ave., Indianapolis, Ind. At the left is shown a Marschke swing grinder which is particularly useful for such heavy duty grinding jobs as snagging big castings. (April BB p. 158.)



DEEP DRILL SHARPENER — Pratt & Whitney, West Hartford, Conn. The deep hole drill sharpening attachment shown above, was developed to sharpen single lip drills with straight or helical chip grooves, \( \frac{8}{3} \)" to 2" inclusive diameter range. (Sept. BB p. 268.)

POWER FEED DRILL PRESS—Walker-Turner Co., Inc., 1751 Berckman St., Plainfield, N. J. The 20" press shown at the left is available for power feed, hand or foot feed applications. The machine is equipped with a No. 2 Morse spindle taper nose and is available in single or four spindle models. (Feb. BB p. 156.)



#### SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate ideal for small tool and die shops—saves time these five different ways:

- Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
- 2 Saves time and expense of drawing or tempering small metal parts in large furnaces.
- 3 Cuts handling time when normalizing or annealing small parts. No waiting.
- Conveniently available for pre-heating for subsequent high-speed hardening.
- 5 Eliminates shut downs and delays in servicing emergency repair orders.

#### AVAILABLE IN TWO SIZES

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8"W 6"H 14"L	29.6	3400	14.8	\$124.00*
MH-4	10"W 6"H 18"L		4800	20.9	\$191.00*

\*Includes Hearth Plate

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—\$142.40.



REPLACEABLE HEATING ELEMENTS—Replaceable nickel chromium resistors embedded in rectangular refactory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

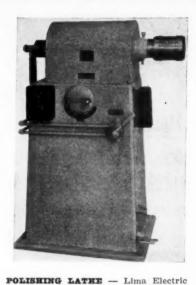
FREE Complete data covering specifications, addi-

tional applications and ordering instructions are included in this new folder. Write for your copy today. Ask for Bulletin No. 50.



COOLEY ELECTRIC MANUFACTURING CORP.
213 S. SENATE AVENUE . INDIANAPOLIS, IND.

SPEED LATRE—Schauer Machine Co., 2064 Reading Road, Cincinnati, Ohio. This unit is especially designed for polishing and finishing cylinders for aircraft engines. An expanding mandrel holds the work. Mandrel is air operated. Any spindle speed desired from a low of 105 rpm to a high of 1155 rpm is available while running. These lathes can also be supplied with single or two speed motors—and also with three or four jaw chucks or special holding devices. (Jan. BB p. 230.)

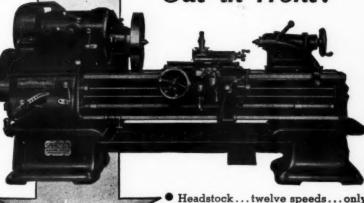


Motor Co., Lima, Ohio. This magnetic polishing lathe handles small steel parts difficult to hold in conventional chucks or collets. Handles steel parts from 2" to 5" in diameter and face plate of

W. Division St., Chicago, Ill. This unit is designed for miscellaneous finishing operations with collets or chuck. It is powered by 1 hp built-in motor with variable speed control, using a Reeves standard pulley and belt. (Oct. BB p. 278.)



## PRINGFIELD PRECISION LATHE Out in front!



SEND TODAY FOR BULLETIN No. 161

Tells the why and how of Springfield's accurate production. Headstock...twelve speeds...only half of the easy-shifting spur gears mesh at one time.

Motors . . . V-belt or silent chain drive. Bed . . . permanently true—made of high test alloy to resist warp or marring under severe service.

Apron . . . extra heavy—operates on Ball and Bronze bearings throughout.

Taper attachment . . . hair-trigger adjustment.

Compound rest . . . sturdy, firm.

Tailstock . . . all bearings and bed ways oiled from one well.

From headstock to tailstock—the SPRINGFIELD Lathe is out in front!

THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD

OHIO. U. S. A.



HEADING PRESS—E. W. Bliss Co., 53rd St. and Second Ave., Brooklyn, N. Y. 250 to 300 cases per hour are said to be obtainable with 2 pressings per case on the 1500 ton hydraulic press shown at the left, used for heading 105 mm how-itzer cases. (June BB p. 184.)



PUNCH PRESS—Duro Mfg. Co., 800 E. 61st St., Los Angeles, Callf. Presses of the type shown above are available in 1 and 4 ton models. They are said to have many advanced features ordinarily confined to heavier presses. (June BB p. 274.)



ANGLE TYPE PRESS — Lake Eric Engrg. Corp., Buffalo, New York. Illustration at the left shows vertical and horizontal operating units of the 450 ton angle type press, complete and ready for connection to accumulator pressure system: (Sept. BB p. 307.)

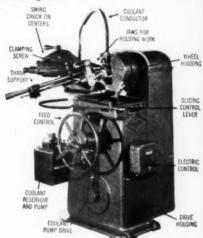


## The GIRL and the GRINDER

MARGARET HOPSON operates a Model 6-G Sellers Drill Grinder. Operation and control levers are so simple and the automatic location of the point and the angle of the cutting lip so positive that she has no difficulty in grinding perfect drills —from the tiny \( \frac{1}{4}'' \) size to the big \( \frac{3}{4}'' \) drills she is working on.

RELEASING needed manpower for our 7,500,000 Army (and for all the other Services) Girls in Industry are rendering a patriotic service that will not be forgotten. For the production lines of U. S. industry must not slacken ... must, in fact, be speeded up, and at the same time all possible manpower must go into our armed forces. Girls in Industry are making this possible... and tools like Sellers Drill Grinders are helping.

Drills are a vital factor in production, and drill grinding therefore is a daily necessity in all large plants. Fast, accurate drill grinding insures clean round drilled holes and prevents production delays. The simplicity of the Sellers Drill Grinder makes it possible for these girls to grind the largest as well as the smallest drills to precision accuracy and with a speed that is astonishing.

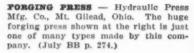


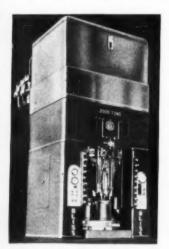
WILLIAM SELLERS & CO., INC., 1620 Hamilton St., Phila., Pa.





PIERCING PRESS—Baldwin Southwark Division, Baldwin Locomotive Works, Philadelphia, Penna. At the left is shown a 500 ton piercing press for shell forging. Main ram is 32" in diameter and the stroke is 42". Working pressure is 1500 lbs. (July BB p. 234.)







HEADING PRESS—E. W. Bliss Co., 53rd St. and Second Ave., Brooklyn, N. Y. The 1500 and 2000 ton presses for cartridge heading work are similar to the one illustrated. The Bliss line also includes 2800 and 3300 ton hydraulic presses for similar applications. The presses are entirely self-contained, being operated by a 75 hp motor on main drive and a 7½ hp motor on ejector drive. (July BB p. 277.)

#### W The Put Your

#### **IDLE MOTORS**

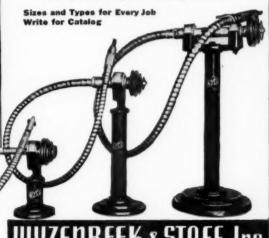
#### into War Production

Put those extra motors to work! The WYCO Line provides not only complete Flexible Shaft Machines and Replacement Shafts, but also Multiple Speed Jack Shafts for belt operation—both bench and floor mounting units (illustrated below).

All WYCO Flexible Shafts are equipped with standardized interchangeable parts, couplings and fittings. Cores run in the WYCO Non-Metallic Innerliner, an exclusive patented feature assuring less vibration and longer wear.

If you have grinding, polishing, snagging or drilling operations, where space is limited or tool approach a problem, WYCO Flexible Shaft Tools may prove the solution. WYCO's technical staff is always at your service to recommend tooling methods, and the proper type of equipment and accessories for best results. No obligation, of course.

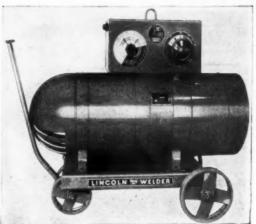
#### **Prompt Delivery on Priority Orders**



844 W. Hubbard St.,

Chicago, U.S.A.

ARC WELDER CON-TROL - The Lincoln Electric Co., Cleveland. At the right is shown an improved design of the Lincoln system of "dual continuous control" for arc welding machines said to eliminate need of meters indicating volts and amperes. These welders have both job selector and current control calibration and are equipped with dials indicating the type of work and the number of amperes for each and every setting. (Feb. BB p. 178.)





ENGINE DRIVEN WELDER — The Lincoln Electric Co., Cleveland, Ohio. An engine driven arc welder especially designed for job welding and garage work and embodying a new system of engine speed control for maximum fuel economy and minimum engine wear is shown at the left. Of 200 amp size this d-c unit has a current range of from 40 to 250 amps. (March BB p. 242.)

ARC WELDER—General Electric Co., Schenectady, N. Y. The "Strikeasy" Arc Welder shown at the right is a 150 ampere decunit for use in fabricating bright-surfaced, thin-gauge metals such as aircraft tubing (SAE-4130) with a wall thickness of 35 mils. The wide welding range of this unit is said to permit use of shielded arc electrodes as large as 3/16 and as small as 3/64" dia. (Feb. BB p. 228.)



# WHEN YOU BUY RSCO DIAMONDS YOU BUY Maximum Roduction.

The real value of a diamond tool is not its price
... but the production it turns out. That means
getting diamonds of exactly the right type, size
and quality for the needs of your operation.

All diamonds in ASCO Diamond Tools are carefully selected for hardness and structure—then expertly set to provide the utmost in durable, keen-cutting qualities necessary for precision truing and dressing. Thus, your grinding wheels cut clean, accurately and at highest capacity...resulting in greater production and lower cost.

For more than 30 years, Anton Smit & Co., Inc. has specialized in industrial diamonds and diamond tools. You can rely upon the advice of our representatives and the quality of ASCO Diamond Tools to help you obtain maximum production. Write for literature.

Truing and Dressing Tools • Impregnated Dressers • Ascopoint Dressers • Hand Truing Tools • Conepoint Tools • Valve Refacing Tools • Phono Points • Shaped Cutting Tools • Tungsten Diamond Wheels • Wire Dies • Core Bits • Diamond Powder.



#### ANTON SMIT & CO., Inc.

Leonard J. A. Smit, Managing Director

333 WEST 52nd STREET NEW YORK, N. Y.

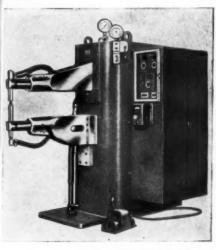
Detroit: ANTON SMIT INDESTRIAL DIAMOND CO., Inc., \$100 Lymbo Ave.

REMOTE WELDING CONTROL-Hobart Bros. Co., Troy, Ohio, The remote control unit shown at the right is now a standard production feature of all Hobart welders. The makers believe it will increase weld quality, especially in the case of welds made under modern high speed techniques. It is said that 1.000 combinations of voltage and current are possible with this multi-range dual controlled dial. (Oct. BB p. 372.)





BOCKER ARM WELDER—Sciaky Bros., 4915 W. 67th St., Chicago, Ill. The sturdy welder shown at right is intended for spot welding of aluminum and its alloys. It embodies the regular Sciaky features and also some innovations. It has a welding capacity of .080" plus on 24-ST Alclad. (Dec. BB p. 322.) SEAM WELDER—Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich. At the left is shown one of the line of seam welders offered in three capacity ranges and 126 models. These welders are designed for either interrupted or continuous seam welding. (July BB p. 236.)



#### AMIC

#### Comparator

This modern instrument is designed for accurate, convenient and quick checking of components, either in the tool room or on the production line—permitting precise gaging throughout the whole day without eye fatigue. Each small line on the scale represents 1/10,000th of an inch. Replaces in many instances special gages.

#### A REMARKABLE IMPROVEMENT

Clear reading on 6<sup>st</sup> scale, with inch and millimeter readings. Magnification is 1000.

Measuring capacity is plus or minus .003\* and plus or minus .05 mm.

Pointer comes to rest immediately.

Pointer moves in the plane of the scale, thus avoiding any error in measuring due to parallaxis.

Provision for convenient lifting of the contact pin.

Two fine adjustments for easy setting.

Convenient red mark limit hands control tolerances.

Interchangeable backstops and accessories.



Our longstanding experience is at your disposal.

Consult us regarding your measuring

problems—we will solve them.

Manufacturers of Gages, Jigs, Fixtures, Service Tools

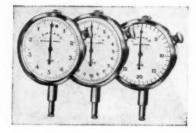
AMERICAN MEASURING INSTRUMENTS CORP.

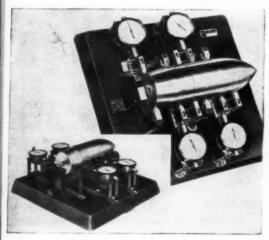
240 West 40th Street

New York, N. Y.



DIAL GAGES—Lombard-Governor Corp., Ashland, Miss. Three of the 4 types of Lombard gages are shown at the right. Dials are 2" in diameter and turned to set 0 to pointer position. (April BB p. 248.) BEVEL GEAR GAGING—Herkimer Tool & Model Works. Herkimer, N. Y. The sine bars shown at the left are said to reduce the gaging of bevel gears to its simplest form. As no involved complications are to be considered, gaging may be performed by anyone with knowledge of blueprint reading and ordinary gaging practice. (July BB p. 336.)





DIAMETER AND CON-CEMTRICITY GAGES— Federal Products Corp., Providence, R. I. The 236 B-95 portable shell gage shown at the left provides for checking diameters at 4 points, independent of each other. (May BB p. 238.)



One reason Sossner taps last longer and cut more perfect threads is because the tap blanks have been heat-treated in time-temperature-atmosphere controlled furnaces. All Sossner taps are precision ground from the hardened high speed steel stock!

TAPS AND GAGES OF AMERICAN NATIONAL AND BRITISH
THREAD FORMS IN SPECIAL AND STANDARD SIZES

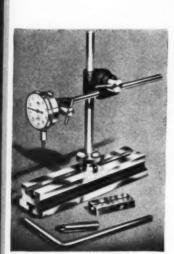
TAPS GAGES SOSSNER

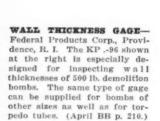
STEEL STAMPS CUTTING TOOLS

"32 year reputation for reliability and precision workmanship."

Write to SOSSNER 225 Centre St., N.Y. or 26 B'way, Lynbrook, N.Y.

PITCH DIAMETER GAUGE—Federal Products Corp., Providence, R. I. With so much work being done on British as well as American war material, the Model 45 B-80 pitch diameter gauge shown at the right is very useful since it is adjustable in inspecting both types of threads. (April BB p. 210.)







DIAL INDICATOR—B. C. Ames Co., Waltham, Mass. The No. 2 testing outfit shown at the left is handy for determining flatness of surfaces, roundness and trueness of revolving parts, relative heights and thicknesses, etc. (May BB p. 192.)





Hoffman Filters effectively remove abrasives, chips and dust from coolants recirculated on machine tools, and give an abundant flow of clean coolant over long working cycles. They effect important economies in the life of tools and abrasive wheels, eliminate scratches on precision-finish, hardened-and-ground articles, and reduce rejects and failures in service. They are especially valuable to manufacturers of gun and aircraft engine parts, gages, ball bearings, etc.

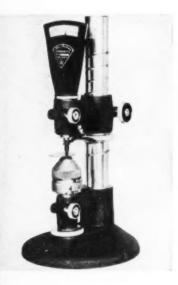
Hoffman Filters are built either in smaller sizes for application to individual specific machine tools or in larger sizes for centralized coolant treatm.... The above illustration shows Hoffman equipment for supplying continuous flow of clean coolant to sixty automatic tiread grinding machines.

REMOVES ABRASIVES
ELIMINATES SCRATCHES
LENGTHENS TOOL LIFE
REDUCES REJECTS

SEND FOR LITERATURE

U. S. HOFFMAN GORPORATION ENGINEERING SERVICE

COMPARATOR—B. C. Ames Co., Waltham, Mass. The No. 26 amplifying comparator shown at the right is intended for use in making comparisons of duplicate parts for size and is said to indicate the most minute variations on the dial, with ability to give repeat readings. (Feb. BB p. 248.)



chasuring thin work—George cherr Co., Inc., 122 Lafayette St., New York, N. Y. The new ball measuring nyil on the comparator shown above is esigned to facilitate measuring of thin york. It is claimed that with this new quipment, inspection and measuring of xtremely thin pieces, such as crystals, iminations, shims, extremely small ages and other flat work can be accomilished easily, rapidly and with accuate results. (Nov. BB p. 332.)



COMPARATOR—Portman Machine Tool Co., Beechwood and Hillside Ave., Mt. Vernon, N. Y. The P222 optical comparator shown below has a 20" dia. image screen, making it possible to project an unusually large area. (Oct. BB p. 280.)

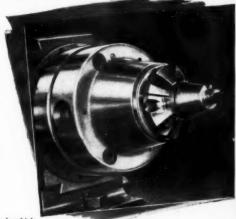


nose-type collet chuck...

simplifies set - up

for ACCURATE

milling of pinions



ere's just one example of the way in which precision nose-type collet chucks can be quickly and easily adapted to handle work that might otherwise necessitate special equipment. The chuck is mounted on the dividing head of a standard milling machine and the work is the milling of teeth to close limits of accuracy on bevel pinions of special design. Collets have been machined to provide clearance for the milling cutters and, by changing to collets of different capacities, a variety of sizes of pinions can be handled.

Especially important, in a set up of this kind, is the ability of the chuck to maintain consistent accuracy in centering of the work, a feature assured by the uniform full-length bearing grip of the collets in Cushman precision nose-type collet chucks,

Every day, Cushman Engineers are helping chuck users to solve special chucking problems presented by the many new types of work called for in armament production and to conserve and utilize to the full chucking equipment already available. Feel free to call upon us for the help you may need. The Cushman Chuck Company, Hartford, Connecticut.

#### CUSHMAN

A World Standard for PRECISION



Gisholt Machine Co., 1185 E. Washington Ave., Madison, Wis. The portable wattmeter type balancing unit shown at the left, is capable of one man easy transfer where needed. It was designed by Westinghouse research laboratories to detect unbalance in large rotating parts

of special design without disassembly.

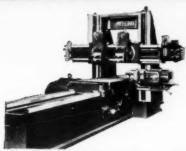
(June BB p. 304.)

OPTICAL COMPARATOR—Portman Machine Tool Co., 1719 Beechwood Ave., Mt. Vernon, N. Y. Objects to be measured, inspected or compared are simply placed on the work rest member of the stage. The optical system permits ready change of image magnifications. Standard magnifications available are:—10, 20, 30, 31¼", 45, 50, 60, 62½, 80 and 100. (March BB p. 252.)





COMPARATOR — American Measuring Instruments Corp., 40 West 22nd St. New York City. The AMIC comparator shown at the left provides a magnification of 1: 1,000. A .001" displacement of the measuring pin causes hand to move one full inch on the 6" dial. Each inch on the dial is subdivided into 10 lines, each division indicating .0001". (Oct. BB p. 290.)



### Liberty \* PLANERS \*

#### **Available for Quick Deliveries!**

Double Housing Heavy Duty Planers in sizes from 36° to 132°. Open Side Heavy Duty Planers in sizes from 36° to 72°. Convertible Heavy Duty Planers in sizes from 36° to 144°.

Double Housing Medium Duty Planers in 48° size with 12, 16 or 20 ft. tables.

Double Housing and Open Side Standard Duty Planers in sizes from 22\* to 48\*. 132° x 84° x 24' Double Housing Heavy Duty "Victory" Planers.

48" x 48" x 20' Double Housing Medium Duty Planers with 12, 16 or 20 ft. tables.

72" x 72" x 20' Double Housing Heavy Duty Planers.

42"x42"x12" Open Side Heavy Duty Planers.

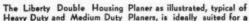
30"x30"x10' Open Side Standard Duty Planers. 24"x24"x8' Open Side Standard Duty Planers. Delivery in 2 to 3 months

Delivery in 2 to 3 months.

Delivery in 5 to 6 months.

Delivery in 4 to 5 months. Delivery in 2 months

Delivery in 2 months.



large amount of production lying within a well defined range. Rigidly constructed and equipped with one, two, three, or four heads, this planer will handle precision work with maximum cutting feeds and speeds. Push button control enables operation from either side with greatest ease. Constant lubrication.

The Liberty Open Side Planer as illustrated, typical of Heavy Duty Planers, will meet the requirements of the shop handling work of variable widths on a single machine. The wide faced housing insures the rigidity required for heavy roughing cuts as well as finishing. But but ton control allows operator to handle this machine from either side. Motorized rail clamping. Constant lubrication.

Write for Catalogs No. 152, 153 and 154 fully describing these Liberty Planers.

#### LIBERTY PLANERS, INC.

1014 WELLER AVE.

HAMILTON, OHIO, U.S.A.

#### Acro Die Set Pullers

Tool and die-makers are mechanics too highly-priced to be placed at the labor often involved in separating die sets, says Acro Metal Stamping Co., 388 E. Reservoir St., Milwaukee, in a circular announcing a new tool to do this work . . . the Acro Die Set Puller. illustrated.



Its principle is to remove the punch-holder from the die-shoe by a straight upward pull, so punch-holder travels upward axially, from die-shoe, leaving both leader pins at the same time. This, the circular points out, can be done only by using indexed screwwrenches controlling upward travel, a patented feature of the Acro device.

It is said to be particularly timesaving on large dies, where, during course of construction, continual separating of sets for aligning and mounting punches, slows down tool makers to a point where efficiency is impaired.

Four simple steps are employed in operating the separators: 1: Pullers are inserted under punch-holder. 2: Screws atop leader pins are turned down. 3: Screw wrenches are adjusted to proper position—acting as indicators to equalize pull on leader pins. 4:



Wrenches are turned clockwise simultaneously, effecting smooth, positive removal of punch-holder without binding.

Sizes are available with diameters of lead pins ranging from 1 to 2", and with maximum openings from 2½ to 3".

Full details are given in the firm's bulletins covering the apparatus.

#### **Acme Tool Catalog**

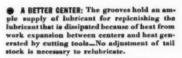
New 54-Pg. catalog by Acme Tool Co., 200 Church St., New York, shows as much as possible of the firm's line of precision production tools. But the line is so comprehensive, says the foreword, that many items could not be given space. In addition to accessories for multi-purpose tools, angle plates, chucks, centers, gage blocks, and virtually all everyday machine shop needfuls, the firm is prepared to offer service on special tools to be made from blueprints.

Detailed, also, is Acme's Cliometer . . . new instrument for determining with precision inclinations towards true vertical or horizontal, which, it points out, is finding increased use in aircraft and other war production plants

Copies of the new catalog may be had by request, on your firm's stationery.

# 1500% LONGER RUNNING TIME

BEFORE CENTER POINT NEEDS ATTENTION



Because the grooves are left-hand (in the same direction as the turn of work) they prevent dripping and force lubricant to extreme point of center assuring proper lubrication of entire bearing surface...No production delays to replace galled or burned-out centers!

♠ A BETTER LUBRICANT: CMD Center Point oil withstands pressures greater than 50,000 lbs, per square inch. Lathe centers can be drawn up tight against work permitting finer tolerance and higher precision results. Helical Groove

When Used With
CMD CENTER POINT
LUBRICANT

has an operating ratio of from 15 to 1 running time over the conventional type of lathe center.

#### Write for FREE Sample Kit

#### CHICAGO MANUFACTURING & DISTRIBUTING COMPANY

Dept. 1-BB, 1928 West 46th St., Chicago, Ill.

- ☐ Send circular on CMD Helical Groove Centers
- ☐ Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT LUBRICANT and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

NAME...

FIRM NAME.

ADDRESS

#### Model A Hydro-Borer



A new boring machine is now available for align-boring of aircraft radial cams, master rods, link rods and connecting rods.

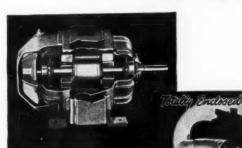
Known as the Hydro-Borer, it handles any type of connecting rod or radial cam bearing quickly and accurately, leaving a smooth even bearing surface whether babbit, CS-50, copper lead or heat treated alloy steel.

Features include simplicity of design, hydraulic feed of boring bar, and a pressed steel cabinet with tool shelves inside. There are no moving parts on the machine, with the exception of the hydrostatic boring part itself. The size limits of boring vary from a minimum 34 to 6 inches in diameter with a 5 inch travel. The boring bar is constructed of case hardened alloy steel bar, 11/4 inches in diameter, suspended at either end by hardened ground steel bushings which do not require packing. There is a Meehanite alloy piston on the bar with a helical external groove, and the piston fits in a cylinder, generating a pressure on the piston of approximately 600 pounds psi. A simple bypass valve, manually operated, can control the speed of the feed at will. Each turn of the bar drives the cut-ter forward .006 in. at normal feed. Speed of the bar is 350 rpm and a 2pulley motor gives it a slower speed for larger bores. A hand crank is supplied for hand operations in an emergency. This unit has many other diversified industrial production uses and is available for early delivery; manufactured by Air Parts, Inc., 723 Sonora Ave., Glendale, Cal.

GORTON VICTORY DE-CALS SPUR PRODUCTION—Another red, white and blue Victory decalcomania goes on a Gorton machine completed ahead of schedule, "hi-signing" it as critically needed, ready for non-stop production in America's stepped-up war drive to "Win with Work". In the picture taken in the George Gorton Machine Co., Racine, Wis., plant, George Gorton, Ir., Vice-President (center) and his fother George Gorton, Sr., President an diounder of the company, watch Bill Lipp, Assembly Dept. General Foreman, applying the Victory slogan decal to a Gorton Die and Mold Duplicator.



### ELECTRIC MOTORS and DRIVES





#### TYPE EA

#### FAN COOLED 1 TO 15 H. P.

#### PROMPT DELIVERY

Reasonable deliveries can be made on both TORQ MOTORS and TORQ - QUA-MATIC DRIVES to plants with priority ratings.

BALL BEARING — STEEL BUILT — SEAL-ED AGAINST HARMFUL OIL CHIPS AND ABRASIVES — MADE FOR REAL PRO-DUCTION

#### TORQ-QUA-MATIC

DRIVES

FOR MACHINE TOOL CONVERSION

- A 4 SELECTIVE SPEEDS
- B . SIZES 1 TO 15 H. P.
- C . ALLOY STEEL GEARS
- D ANTI-FRICTION BEARINGS

PROVEN DESIGN — IMPROVES PRODUC-TION UP TO 25%





Send for FREE descriptive literature containing complete details and specifications on TORQ MOTORS and TORQ-QUA-MATIC DRIVES.

THE TORQ ELECTRIC MFG. COMPANY

# ROGERS Perfect 36" VERTICAL TURRET

### 

MODEL

"Step up your War Production" is the command of the day.

#### QUICK DELIVERIES ATTRACTIVELY PRICED

"Double Quick" Boring, Drilling, Reaming, Turning and Thread Cutting of non-ferrous forgings and castings are delivered on Rogers "Perfect 36" High Speed Vertical Turret Mills.

### MORE, MORE AND MORE PRODUCTION

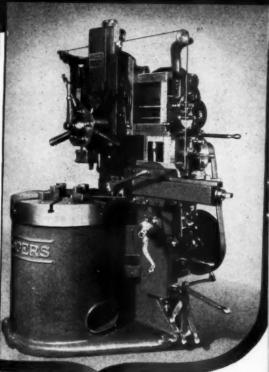
Rogers High Speed Model Main Drive operates at 760 R.P.M. — twice as fast as Standard Model. The 8 Spindle Speeds are also doubled.

SPECIAL SWIVEL SIDE HEAD and ADJUSTABLE MAIN HEAD provide 2 machining operations at the same time. These 2 machining operations plus "double quick" main drive speed produce MORE WORK FASTER.

Write for catalog today.

Knowing How Since 1885

ROGERS MACHINE WORKS



### SPECIFICATIONS OF ROGERS HIGH SPEED MILLS

36\* diameter machining capacity.

8-positioned swivel side head adjustable up to 350 each side of horizontal.

5-positioned main turret adjustable up to 300 each side of vertical.

4-jaw horizontal chuck.

Table to turret 23# maximum.

Rapid power-driven mainhead and rail.

Foot operated controls.

Main Drive operates at 760 R. P. M.

8 spindle speeds are: 9. 8, 14. 8, 23. 2, 34. 8, 52. 1, 78. 1, 122. 4 and 183. 6 R. P. M.



With pride, the entire organization of the Buffalo Forge Company welcomes this new banner which now joins Old Glory over its plant!

The Army-Navy Production Award "for high achievement in war production" means to the workers at Buffalo Forge the recognition of their determination to see production's job through—efficiently and swiftly. The "E" Flag shall serve as an unfailing inspiration to carry on with ever intensified effortand cooperation—to hasten the ultimate Victory of our armed forces.





Buffalo Aircraft Type Bending Roll actively enlisted in plane production

#### BUFFALO FORGE COMPANY 161 Mortimer St., Buffalo, N. Y.

Branch Offices in Principal Cities Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

#### Works Around Corners



Loss of time and temper can be saved by using this ingenious around-corner screwdriver, says the maker, L. B. Miller Co., Brooklyn, N. Y. It has a shaft of laminated steel wire, instead of the coiled spring usual in flexible

shaft devices, and a specially hardened screwdriver bit. Overall length is 8 inches. Handle is shock-proof. A glance at the picture suggests the many uses for this tool, said to be efficient in production and assembling operations, as for servicing small machines.

Socket sets are also available, containing 6 hex sockets from 3/16 to ½" and with 10" flexible drive, all packed in a handy metal box. Socket sets are of same quality construction as the screwdriver.

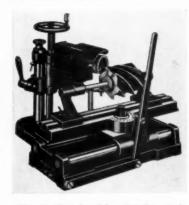
Detailed descriptive material is available from the maker.

#### Cutter-Grinder with Dividing Head

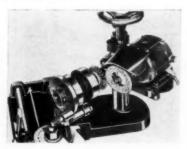
Extreme flexibility, quick, low-cost set-ups without disturbance to production grinders; wide cutter range applicability; compactness; absence of vibration; sturdy construction; and price sufficiently low to permit use in every shop, large or small—these are the features stressed for the new Hilco Universal Cutter-Grinder announced by the Berco Mfg. Co., 429 W. Superior St., Chicago.

Furnished with an interchangeable table or flat bed attachment and a special universal index dividing head, the Hilco, regardless of type tool ground last, may be set up in just a few minutes for any other type cutter. The matters assert it will grind any concave, convex, helical, straight, tapered.

angle or special cutter up to 6 inches in diameter and any saw up to 18 inches in diameter—regardless of cutting angle required.



The dividing head has 7 index circles consisting of micrometer-placed holes or stops which insure uniformity of cutting edges in the finished cutter, regardless of the number of teeth or cutting surfaces. Any simple conceivable or compound angle, horizontal, diagonal or vertical, direct or reverse position may be set up to accommodate any type cutter.



The Hilco is a compact bench type machine, 21 in. long, 17 in. deep and 17 in. high and weighs approximately 135 pounds. A new bulletin shows a number of possible set ups.



But the lounge of a luxury liner has never supplied purer air than that breathed by our boys crowded around the fuming diesel engines of these small craft.

Ventilation must be sure. Not for comfort, but for life itself. When it was decided that no ordinary motor could be depended upon to power the vital exhaust fans necessary, WELCO was called on to build the special water-proof, drip-proof motors that would not fail.

In war or peace, when a *special* motor is needed, look to WELCO.

The B. A. WESCHE ELECTRIC CO. 1628 VINE ST. CINCINNATI, OHIO



### "Tooling Up" for



#### Colonial Broach Sharpening Machine

A NEW universal broach sharpening machine, for round or flat broaches is announced by Colonial Broach Co., 147 Jos. Campau, Detroit. Streamlined in design and rugged in construction, it is designed to assist shops in doing their own broach sharpening by providing a rapid and accurate means of maintaining the same tooth forms and cutting effectiveness as originally provided by the broach maker.

The sharpener is designed to accommodate flat broaches up to 65 inches in length between end teeth, and round broaches up to 72 inches between centers and 6 inch overall diameter. The change-over from round to flat broach sharpening is accomplished with few adjustments and without special tools.

The new machine consists of a broad rectangular cast iron base of rigid construction. The ends are extended outward to provide a full-length support from the working table, which has an overall length of 99 inches. The table

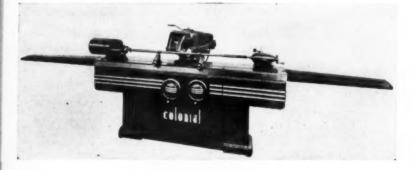
travels on one flat and one V- shaped way. Ends are provided with dust guards. Lubrication of table is maintained by rollers submerged in oil wells which contact the sliding surfaces. Width of working table is 11½ inches.

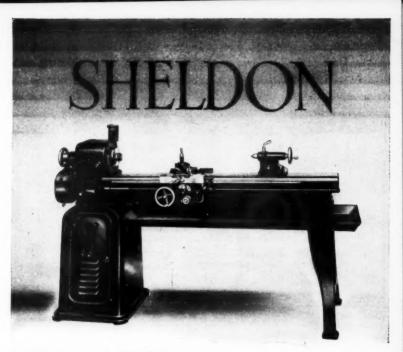
Grinding wheel head is mounted on a vertical column attached to bed of machine with replaceable V gibs. Maximum amount of travel is 12 inches.

Above graduated indexing support at top of vertical column, a cross slide is mounted. The cross slide provides a 10 inch travel of grinding spindle transversely to working table.

Grinding wheel spindle is mounted on preloaded precision ball bearings and is belt driven by a ¾ hp, 3600 rpm motor. Interchangeable pulleys provide various spindle speeds up to approximately 7500 rpm.

Two hand wheels provide 3 movements of grinding wheel head and work





#### Sheldon BBU-1242 WQ Precision Lathe

This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round), the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl headstock. Its improved Sheldon 4-speed, V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has anti-friction bearings. It is so designed that spindle belts operate thru a standard 1-piece bed. This bed is bridge-braced with heavy cross girts and has hand scraped ways—2-V ways and 2 flat ways.

If interested in 10", II" and I2" quality lathes be sure to see the SHELDON.

SHELDON MACHINE CO., INC.



table. Rotation of hand wheel on the right, moves table to the right or left under grinding wheel head. Left hand wheel has 2 positions, In and Out. In the former, rotation of wheel controls



SCREW MACHINE CIRCULAR TOOLS IN STOCK, Write for Complete List.

George L. Detterbeck Co. Formerly Banner Mfg. Co. Chicago, III.

1871 Clybourn Ave.

horizontal feed of slide and grinding wheel head. In the Out position, hand wheel controls vertical movement of grinding wheel head. Shift from In to Out position is quickly made by de-pressing a small lever behind hand wheel. A quick-action lever, above and left of grinding wheel head provides a rapid traverse action for horizontal slide.

For cylindrical broach sharpening, headstock is provided with a 1/3 hp motor and reduction gearing to pro-duce 2 spindle speeds of 200 and 400 rpm. Speed change is actuated by a shifter lever contained in headstock housing. Tailstock is equipped with a spring-loaded quick-release lever. For this type of sharpening, left hand wheel is placed in the In position. Barreltype steady rests, furnished with each machine, are of rigid construction with contact points made of round fibre to prevent injury to broach. Table mounting for steady rests is actuated by quick-acting lock screws for rapid location and adjustment.

The headstock and grinding wheel spindle motors may be for 220 or 440 volts. Push button controls with overload and low voltage releases are provided. Total space occupied by machine is approximately 20 by 4 feet, including maximum table travel. Weight of machine is approximately 6800 lb.

The small illustration shows machine set up for flat or surface broach sharpening, with broach segments mounted on magnetic chuck and using quickaction lever for transverse movement of the grinding wheel head.

#### Rotary Files

These files are available in a number of different styles and sizes, in either High Carbon Steel or High Speed Steel.

Send for catalog showing a wide variety of standard shapes and special shapes. Perhaps we have what you want in stock, if not, we can

The Rotary File Co.



#### Hand Cut

If you have need for special shape Files, we shall be glad to submit the desired File for your approval and trial upon receipt of a sample or sketch.

This service is designed especially for your conven-ience, for which we make no charge.

STRATFORD, CONNECTICUT

# WAGNER can fill WAR INDUSTRY'S NEED FOR DEPENDABLE MOTORS





Write for your copies of Bulletins MU-176, MU-182 and MU-183



are used an machine tools and other

electrically driven equipment that

operate in clean, dry locations. 1/6

to 400-hp, 25 to 60 cycles, 2- or 3-phase

It takes plenty of dependable motors, operating at top efficiency, to maintain the high-speed production so necessary in our "all-out" war effort.

Wagner fully realizes this, and is working day and night turning out more motors now than ever before, and is supplying these reliable motors wherever they are needed to help our country on to victory.

If you need motors to carry on your warmaterial production, consult Wagner. Twenty-five sales and service branches, located in principal cities, are ready to help you in selecting the RIGHT Wagner motor for the job.



9442-32 A



Type HP motors are ideal for machines located where inflammable materials and substances are handled or manufactured. 3/4 to 125-hp, 2- or 3-phase, 25 to 60 cycles.



Type CP totally-enclosed fan-cooled motors are widely used on machine tools where dust, dirt, filings, chips, fumes or other destructive elements are prevalent. 1-1/2 to 125-hp, 25 to 60 cycles, 2- or 3-phase.

### Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, Mo., U.S.A.

MOTORS • TRANSFORMERS • FANS • BRAKES

#### Castings

Castings are often cleaned from foundry s and in a a tumbling barrel, sometimes using foundry slag with the charge. A better method for quick cleaning of small castings is to use a sandblast barrel.

These barrels are usually inclined and dave the sand blast inlet at top center of the barrel, so they can be both blasted and tumbled at once. Ordinary small castings are thoroly cleaned from molding sand in 5 or 10 minuates.

A good snagging grinder for taking the snags off of castings is a worthwhile investment where many castings

are handled. One such has provision for 4 different speeds as to rpm. Any of them can be obtained quickly by a hand lever mounted at the front of the machine. It allows speed of wheels to be maintained at approximately their periphery until almost to the flanges.

Fast cutting wheels are as important in the snagging of castings as are good snagging grinders. Remember that slow speed adds to cost of castings without adding anything to value. There are snagging wheels which do a

#### ROTOREX UNIVERSAL GRINDER



Prompt delivery

Designed specially for The Modern Tool Room



#### DOUGLAS MACHINERY CO.

150 Broadway, New York, N. Y.

good fast job, and operate safely at speeds of 9,000 surface feet per minute. As to crooked castings, you may not want to do anything about them, if you can't machine them straight. Not so with malleable castings. Did you know that malleable castings are satisfactorily die-straightened in hydraulic presses made for the purpose? At least one hydraulic press manufacturer has supplied presses for this purpose.

EDITORIAL NOTE: Machines mentioned identified on request.

### STANDARD MACHINERY CO.

METAL FORMING EQUIPMENT



#### TURKS HEADS ADJUSTABLE DRAWPLATES

Adjustable draw plates—accepted by wire trade as accurate, efficient means of producing rectangular and special shapes. With friction or power driven rolls. Catalog TH.

#### DRAW BENCHES ONE MAN TYPE

8 sizes, 2 general types. Machines are of one-man type with all controls at die end. Catalog DB.





#### ROLLING MILLS STRIP AND WIRE

Roller bearing and plain bearing mills; many regular sizes or made to suit user's specific needs. Write fully.

#### SWAGING MACHINES ROTARY TYPE

For reducing diameter of tubular and solid bar stock into cylindrical, conical, or "necked" shapes. Capacities from 1/2" tube, 1/4" solid to 6" tube or 334" solid. Catalog SM.





#### AND THE NEW STANDARD FLUID DRIVE

Suitable for variable speed or controlled torque drive applications. Also suitable for high pressure pumping of fluids.

Unite for Complete STANDARD PROVIDENCE



MACHINERY CO.



### OLIVER DIE MAKING MACHINES

THE basic needs of faster, smoother sawing and filing are met with the Oliver Die Making Machines. Operating efficiency is increased 50 to 60 per cent over hand methods in the making of precision dies, gages, cams, templates and similar products requiring rapid and accurate filing, sawing and lapping operations.

Send for literature describing the line of Oliver Die Making Machines!

### OLIVER INSTRUMENT COMPANY 1408 Maumee St., E. - Adrian, Mich.

We also build Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders.

#### Files for Naval Bronze

Naval Bronze is tough and much more difficult to file than ordinary brass or bronze. Because of its characteristics, very sharp files are required. Files used on castings of this metal must have strong teeth because of the rough surface and other irregularities commonly found on castings. Some castings are still in a sanded condition, resulting in an abrasive action on the file teeth.



To meet a condition requiring a very sharp tooth which will retain its sharpness, and at the same time a tooth that will stand extra abuse, Nicholson File Co. has announced a line of files for use on Naval Bronze.

The teeth of files for Naval Bronze are shaped so that they will not dig into the metal. This is claimed to result in a good finish and counteract any tendency of the files to run off to one side.

Nicholson File Co. has made these files available in the same types and sizes as regular purpose files.

"KEEP 'EM ROLLING"
Buy U. S. War Savings Bonds
and Stamps

### For Victory Plant Operation

FlexoiD

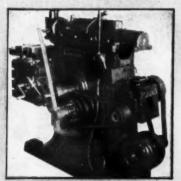
Industrial

Couplings

A coupling by which ends of shafts are permanently bolted to flexible Thermoid Hardy type discs—requires no lubrication—no attention. Authorized dealers in principal cities carry stocks for immediate delivery.

RICE Fiexoid
Tool Holders

No need of right, straight or left hand shank tool holders when using the FlexoiD. Five sizes, 0 to 4.



FlexoiD Unit applied to Shaper

"It's all in the Tool"

with universal head

#### FlexoiD SPeed Control Units

Convert your present line shaft driven lathes, shapers, milling machines, etc., into individual motor drives for the utmost in efficiency and economy.

Write or wire collect for information regarding nearest distributor.

THE SMITH POWER TRANSMISSION CO.

1545 E. 23rd St. CLEVELAND, OHIO MAIN 9450

### Thanks a million...... you've saved us an indefinite tie-up

EXCERPT FROM CUSTOMER'S LETTER

Words like the above have meant much to us at Threadwell. Months ago we knew that it was not enough to have all our wheels turning. We knew it was not enough to sort and pile and route the orders according to priority ratings. That was expected of us. But we felt that we could do more than that. We felt that we could and should break bottlenecks by giving PERSONAL ATTENTION to each order. We have done so. And it has produced results. It has (in some cases) put taps onto the job the next day instead of months later. In all this we have worked hand in hand with a great expediting force... our Threadwell distributors. We share with them the satisfaction of doing more than was expected of us.



#### Centrifugal Force

Centrifugal force, which has forced man to be so careful in obtaining running balance in rotating parts, has become the servant of the machine designer in many cases. Centrifugal casting of pipe, in which molten metal is "spun" into molds, covering walls of mold while under considerable pressure due to centrifugal force, is a practical proposition. Centrifugal bab-

biting machines have been developed and put into use. One claims production of 40 connecting rods babbitted per hour—and a high-class job free from holes or porosity.

Centrifugal force is basic as an operating principle in the well-known flyball type of engine governor. As the speed of the engine increases, the balls are thrown outwardly by centrifugal force, and this action operates to slow down the speed, thus keeping speed constant. Centrifugal force has found applications in the power transmission field. It has been especially valuable in designing clutches and flexible couplings which pick up or assume the driven load gradually, thus making it easy on the driving motor.

You are no doubt, acquainted with the device which actually takes its name from centrifugal force,—the centrifuge. It is exten-

sively used in laundries for drying clothing, and used in different ways in metal working. It is also used, for drying small metal parts, and for extracting oil from chips, to salvage the oil. Similar devices are used for enameling and other finishing services.

Centrifugal force has also been used as a die-actuating principle on a rotary swaging machine, designed for compressing the pocket end of cables.



#### MAKE THEM LAST

Micrometers cannot be replaced easily today — don't let yours be damaged — handle it with unusual care

#### The following suggestions will help save many a micrometer — make others last longer and serve better:

DO NOT measure revolving work.

DO NOT JAM the work against the anvil by forcibly turning the spindle. This may spring the frame or force the measuring surfaces out of line.

Unless micrometers have special measuring surfaces, USE EXTREME CARE in measuring over cutting edges, such as reamers and drills.

DON'T OPEN a micrometer by twirling it.

DO NOT LOCK the Micrometer Caliper at a particular setting and use it for long periods as a caliper gage. The measuring surfaces are too small in area to permit such use for a considerable length of time without excessive wear.

In the grinding room, AVOID EXPOSING your Micrometer Caliper to a flood of coolant containing grit or emery.

DO NOT CARRY your Micrometer Caliper in a pocket in which there may be dirt or grit. Keep it in its box when not in use.

**KEEP** the measuring surfaces apart when putting the tool away. If left together, moisture on them can cause rusting.

FOLLOW lubricating and adjusting instructions issued by the manufacturer.

Reproductions of this advertisement for use an your bulletin board furnished an request.



### BROWN & SHARPE TOOLS



#### This Amazing Chart

40 equations quickly found. Eliminates errors. Determines angles & dimensions, without knowledge of higher math.

Vest Pocket Size Right Triangle Reverse Side

#### Makes TRIGONOMETRY Easy

Machine Shop — Tool Die — Jig Bore — Patterns Layout — Inspection — Drafting

BREAK TIME-WASTING BOTTLENECKS with the TRIG-EASY CHART, for every man whose work requires solution of problems involving angles. Saves his own time and time of those who must wait for calculations.

Correct equation is always instantly found with TRIG-EASY. 18,000 in use today. Pays for itself every time used. You can speed production thru education of personnel. Send for TRIG-EASY today, and only 50c with complete instructions. MONEY-BACK GUARANTEE.

#### TRIG-EASY

E. H. NEEDHAM

DEPT. H., CULVER CITY, CALIF.

QUANTITY DISCOUNT TO INDUSTRIAL FIRMS

#### **Power Distribution**

The importance of selecting the electrical distribution system best suited to the needs of individual industrial plants was recently described to a joint meeting of the Michigan Section of AIEE and the Detroit Industrial Electrical Engineers Society by John S. Parsons, a Westinghouse engineer.

The best overall distribution system must not only consider service requirements and costs, but it also must keep the use of strategic materials to a
minimum. The
system that works
well in one big industry may be totally unfit for its
small neighbor
across the street.
The system that
suited the manufacturer of wooden boxes wouldn't
do at all in a big
steel mill.

The secondary network system now used by more than 50 industrial plants, was designed to detour an industrial power plant's around a bomb hit or other interrup-No single fault anywhere on the system, whether accidental or deliberate, will interrupt service to more than a small part of the plant's production line. Power coming into the plant has 2 possible routes to the production line. If the primary routing is disrupted a bomb hit, sabotage or accident, the electricity automatically

the 2nd route, preventing any outage.

Many previous distribution systems were vulnerable because arranged radially and resembling wheels with projecting spokes. Trouble on any branch of such a system stopped the power flow to all machinery beyond that

Secondary network requires less transformer capacity, less copper and conduit, thus saving materials vital to the war effort.

point.



**BECAUSE** they're made in 4 calibration ranges, dial gauge graduations on Mossberg Torque Tools are larger, more widely spaced. Assemblymen can read 'em easier... measure nut and bolt tensions on motors and other important assembly units faster, more accurately!

**EXAMINE** the improved, inside-the-handle dial mounting of Mossberg Torque Tools and you'll see another reason why they control tensions more accurately. This rigid mounting protects dials from bumps and jounces that might knock them out of adjustment.

WIDELY USED both for production and experimental laboratory work by the U. S. Navy – by plants turning out airplanes, tanks, battleship turbines and by submarine builders – Mossberg Torque Tools have proved 98% accurate under most severe conditions. Write today for complete information on sizes and prices!

#### APCO MOSSBERG COMPANY

155 Lamb Street, Attleboro, Massachusetts

### SPEED UP YOUR SPOT WELDING

There is a difference in spot welding production. As an example, in one case where Ace Welders were put in alongside several of another make, the operators of the Ace Welders set up such a pace that those operating the

other welders asked for a raise in piece rate. The Ace operators were earning 30 per cent more because of greater daily output.

Users of Ace Welders include many of our largest companies as well as many who use but one or two welders—but all are interested in the ease of operation and the increased production that is so vital today.

We are sure you, too, can speed up with Ace Welders,—madeinmanual, automatic motor-driven, and air-operated press models. Write for catalog 41.

PIER EQUIPMENT MFG. CO., 1464 Milton Street, Benton Harbor, Mich.



One of the easiest foot-operated welders made-shorttravel and ease means good production even during the later hours of the day, by men or women.

ACE WELDERS

Saboteur of Manpower

Led by business and industry, America is organizing the greatest counter-attack on accidents in all history. Faced by mounting casualties on the home front already exceeding those on the fighting front, the country is taking unified action to curb the sabotage of manpower by accident.

Since Pearl Harbor 85,000 persons in all have been killed by accident in the United States, 7,700,000 injured. Destruction of human material on this grand scale means something more than personal tragedy endlessly repeated. It means that 410,-000,000 man-days of work have been lost.

Of these fatalities 42,000 were workers.

Even more alarming, 3 out of 5 workers injured were struck down not in line of duty, but off the job.

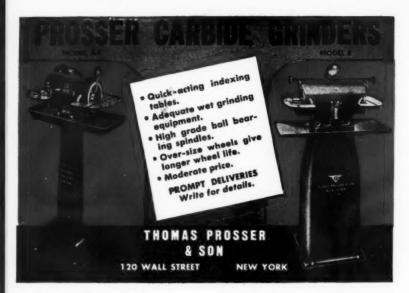
The first move was made by the President of the United States, in a proclamation calling on the National Safety Council "to mobilize its nationwide resources in leading a concerted and intensified campaign against accidents."

Business and industry, the National Safety Council has responded in force. In a spirit of wartime public service, representative leaders decided to undertake the financing of the Council's

of the Council's biggest assignment, and organized the War Production Fund to Conserve Manpower. William A. Irvin, former president of the U. S. Steel Corp., is national chairmanship of the Fund, and Thomas W. Lamont of J. P. Morgan & Co., treasurer. A goal of \$5,000,000 was agreed on, this sum to be raised from business and industry throughout the country.

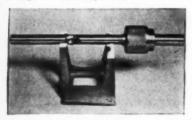
National Safety Council has worked out a very careful plan for using the five million, to get more technical help.





#### Nobur Solves Problem

A burring operation that formerly took 15-20 minutes for each part is now done in 45 seconds, with the aid of the new Nobur burr-removing tool, according to Joseph Fried, Sales Manager of the Nobur Mfg. Co., 910 N. Orange Drive, Hollywood, Cal.



Production requirements for one of Southern California's major aircraft companies demanded that all aileron pulley brackets be completely free from burrs and sharp edges. This necessitated use of small hooked hand scrapers that were inserted from the outer side

in order to remove burrs on inner edges. As a slow hand operation, this job took 20 minutes for the average worker. The cutaway illustration shows how the same job is now done. This tool has a special blade ground for a 2-step diameter, burring outer face and inner shoulder of the ball-bearing seat simultaneously. Twenty-five parts are now finished in the time formerly used to finish just one part. A great improvement in quality of finished work has resulted, Mr. Fried points out. More uniformly smooth edges are obtained. and there is a tremendous saving of time.

Nobur removes burrs or sharp projections from the edges of drilled, reamed or bored holes . . . in one easy, double-quick operation. It can be handled by anyone on any machine with complete safety.

Nobur is available in 1/16" progressive sizes—from 3/16" to 1". Special sizes and special blades to solve difficult burring problems can be furnished upon request.



#### MODEL "B" ROUND COLUMN 4 SPINDLE

For performing a series of operations such as drilling, reaming, counterboring, facing, hollow milling, and tapping in rapid sequence.

#### MACHINE CAN BE FURNISHED WITH ROUND TABLE IF DESIRED.

TURNER TURRET is equipped with ball bearings throughout, is driven by a ball bearing motor and V belts. Spindle speeds are controlled quickly by a single hand wheel, giving infinite variations within its range.

Spindle Speeds for drilling 250 to 1620 RPM. For tapping 85 to 540 RPM.

Table can be set at any angle.

#### SPECIFICATIONS

- 1. Morse taper No. 2 2. Drills to 29/32

- 3. Taps to ½'
  4. Hand feed 6'
  5. Swing 20'
- 6. Square table 16½'x21' 7. Round table 18' dia.
- 8. Adjustment of table 22'
- 9. Max. dist. Spindle to
- 10. Table swings in circle 51' dia.
- 11. Floor space 30'x44'
- 12. Max. dist. spindle to

#### TURNER MACHINE COMPANY, INC.

DANBURY

Est. 1859

CONN., U.S.A.



#### Women Workers

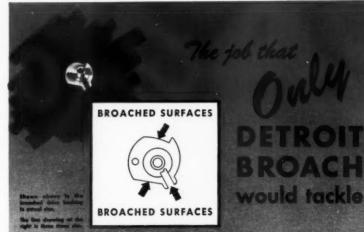
The subject of women workers received considerable attention during the recent War Production Conference held by American Society of Tool Engineers at Springfield, Mass. Attended by over 1,000 tool engineers from all over the country, it was the largest conference ever held by the organization, of which Otto Winter, vice president, Republic Tool & Drill Co., Chicego, is president.

Major interest attended "training" sessions, especially those dealing with women employees, a phase of operations new to many plants now employing or soon to employ women. These sessions were presided over by C. C. Gorham, of Greenfield Tap & Die Co., Greenfield, Mass.

In a paper on the subject of training, Arnold Thompson. Chief Tool Engineer. National Steel Car Co., Ltd., Hamilton, Ont., pointed out that 565 out of 623 operations in Canadian war plants could be accomplished by women. In Eng-Thompson land. said. Royal ordnance factories are now staffed up to 60% by women operators, where-as, in Germany 15.000.000 women are now employed (20%). In Canada, in contrast. the ratio is now

only 1 woman in 80, with a still lower percentage probable in U. S., at the present status of the war production program.

Best source of obtaining necessary women workers, according to Thompson, are girls of 16-20 taken from high schools, etc., with second choice going to 20-24 years-olds who have never had to work before. Women, Thompson said, are better routine workers. They are generally faster on such jobs, and often better than skilled men, on day and night shifts.



This was a job that was lobelled "impossible" as a broaching operation. Detroit Broach engineers believed that it could be done . . . the broaches were designed and manufactured . . . and these tools have, for many months, been in constant use for the production of the part illustrated above.

This broached part is the main drive bushing for the shutter mechanism of one of the finest cameras manufactured in this country. In the broaching of the entire contour, all surfaces

must blend and be in proper relation to each other. The entire operation is held to extremely close tolerances.

This is only one of many tough broaching problems solved by Detroit Broach engineering ability...production facilities ... and efficient "follow-thru."



DETROIT BROACH COMPANY



sizes. Will double output of any single spindle drill press. Quickly adjusted to

desired drill centers from 1/2" to 6".

Send for bulletin.

LINDERME MACHINE & TOOL CO., INC. ■ 12253 COYLE AVE., DETROIT, MICH.

Ideal Blackout Plant

George H. A. Parkman, Westinghouse construction expert, recently wrote the recipe for the ideal war factory- a blackout, bomb-resistant, windowless building from which vital military machines and armaments would flow 24 hours a day, uninterrupted by air raids or sabotage.

A modern "failure-proof" system of factory power supply designed to localize damage from bombing, sabotage and other causes. would assure an unbroken flow of electricity to lathes welding sets and other equipment used to shape machines of war.

Two recent inventions would supply the cleanest air modern science can produce, protecting the health workmen and guarding delicate machine parts against scratch ing. One of these, electric air cleaner the Precipitron, would bar the entrance of air-borne dirt. dust and smoke. The other, the Sterilamp, would stand guard in air ducts, killing bacteria with its invisible ultraviolet rays.

ys. Although this blackout superfactory would be adequate for the manufacture of almost any type of war equipment.. its advantages are so great thev would carry over into peacetime

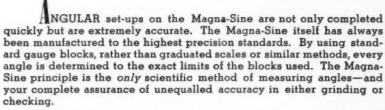
factory construction, inaugurating a new era in improved industrial working conditions.

The building would be made of reinforced concrete, with an arched "eggshell" type roof, to save time and steel and to provide a structure that would suffer least from bombing, sabotage and fire. In a windowless, hence permanently blackedout plant, lighting will be important, because no daylight will enter. Flourescent lamps will be used.



Angular
GRINDING
SET-UPS

Accurate
TO THE LIMITS
OF THE STANDARD
GAGE BLOCKS
WHICH ARE USED



The Magna-Sine saves hours of set-up time . . . has no screws or nuts to tighten or loosen . . . requires no clamps . . . offers guaranteed magnetic efficiency.

Magna-Sines are supplied in two sizes, in both compound and single angle models. Non-magnetic models are also available for inspection purposes. Let us send you full information.

#### ROBBINS ENGINEERING COM

318 MIDLAND AVENUE

COMPANY

DETROIT, MICHIGAN

#### NO. 1 HEAVY DUTY GEARED HEAD HAND MILLER

Available with Longitudinal Power Feed to Table



Table: 6"x24"
Capacity 51/2"x81/2"x18"

Geared Spindle Speeds — 6 forsward, 6 reverse. Optional spindle speed ranges available. 150-675 r. p. m.; 200-900 r. p. m.; 350-1350 r. p. m.

Anti-friction speed and spindle assemblies.

Built in coolant pump and piping. Motor in base.

> PROMPT DELIVERIES

#### ATLANTIC MACHINERY CORP.

149 BROADWAY.

NEW YORK, N. Y.

#### Bell Cranks In Design

A bell crank is a piece of material used to transmit power or motion, or both, in a direction at right angles to the source, or approximately so. In general, bell cranks are right angular in nature, altho they may incorporate angles other than right. In some cases, one or both of the legs may be curved. At any rate, it is an angular unit, pivoted at the corner, and has been found highly useful in countless places.

In an interesting application of the bell crank, it was fitted into a clamp arm for use in connection with a dial indicator. The clamp was attached to the case barrel which surrounds the indicator plunger, and the device used in places inaccessible to a standard dial indicator. One leg of this bell crank is ballended, and the other curved. The ball is placed in contact with the mechanism being tested, and the curved end actuates the indicator plunger. curved leg has a sliding contact on the plunger as it transmits movement

Bell cranks have been used in connection with clutches, where the axial motion of one of the clutch elements had to be produced by motion at right angles. In one case, the bell crank principle

was applied to a hydraulic control valve of the piston release type. Two ears were provided on this valve, extending at an angle from the end of the valve body. They were drilled to receive a pivot pin, on which the bell crank was mounted. The free end of the piston was machined out to a smaller diameter. The end of the bell crank, engaging it, was made heavy and slotted out to straddle it. Thereby it allowed such slippage as was necessary to take place in the motion.

### DESIGNED TO FILL AN Expressed NEED



VERTICAL MILLING MACHINE

The wide welcome it has received shows that the Cleveland No. 1 Vertical

Milling Machine has indeed filled a definite need. Modern production plants, tool rooms, and mold shops evidently wanted these features:

- (1) Big, husky spindle of chrome nickel steel heat-treated and mounted on 200-lb. preloaded precision bearings.
- (2) All lead screws and feed gears mounted on Timken bearings for smooth, quiet running and longer life.
- (3) Overload protection on all motors to prevent motor failure and resultant production breaks.
- (4) Ample coolant sump in base. (Pump optional.)
- (5) Hand wheel and lead screw on spindle head for quick shifting of belts for changes of spindle speeds.
- (6) 12 feeds and 12 speeds to broaden range.

Longitudinal feed, 18"; cross travel, 8-1/2"; vertical travel, 16". Table working surface, 8"x 32". Cutter capacity, 1/16" to 2-1/2" mills. Spindle speed, 100 r.p.m. to 1800 r.p.m.

The "Cleveland No. 1" gives you great speed and power, combined with strength, rigidity and accuracy. It excels on continuous heavy duty production.

Ask for Sommer & Adams Bulletin "B"





astom-Built EQUIPMENT FOR MANY PURPOSES

COMPANY

#### NO OTHER MILLER

Has All the Features of the ARMOR



Write, today, on your firm letterhead, please, for your free copy of our new descriptive folder.

### AIRCRAFT MACHINERY CORPORATION

#### **Tool Conservation**

Dozens of new methods of conserving and salvaging tools were placed before the A. S. T. E. Springfield meeting in the Tool Conservation Session, under Chairmanship of Dr. A. B. Kinzel of WPB.

Such conservation was urged on all U. S. Industry in order to relieve the shortage of special alloy steels. Included in the session were three papers respectively by L. W. Lang, Na-

vage Company,
Detroit; Franz
T. Stone, of
WPB and Arthur A. Merry,
Pratt & Whitney Aircraft
C orp., East
Hartford, Conn.
Among the

tional Tool Sal-

Among the many suggestions offered were:

1. The tipping of worn out and undersize High Speed Steel cutters with cemented tungsten carbide tips—using the tips to re-size the cutter.

2. Recutting of milling cutters to a smaller size when worn out for the job for which they were purchased.

3. Welding, brazing and soldering of broken tools.

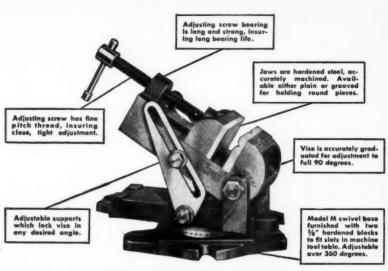
4. The use of longer lived higher - production cemented carbide tools wherever possible.

5. Adoption of carbide tool design, grinding, and maintenance practices for high

According to Mr. Merry, carbide tipping is now being extensively used at Pratt and Whitney to save high speed steel and critical tungsten.

speed steel tools.

In connection with carbides, Mr. Merry said that if we didn't have such tools readily available in this country today the cost to the nation would be measurable in billions of dollars, and added tools and workers.



### This New-Type Vise Will Do Hundreds of Jobs in Your Plant

Drilling . . . Milling . . . Grinding . . . Filing . . . Fitting . . . Marking
On Your Production Line . . . In Your Tool Room . . . On Your Benches

 Vises, as we know them, have been just vises for over a hundred years. But the Palmgren Angle Vise is a new-type vise designed and constructed to meet present day requirements on the production line, in the tool room, on the bench—on all particularly difficult angle jobs.

The features emphasized above and described below will verify this statement.

It can be used on a drill press, a milling machine, or a grinder, eliminating clamps, wedges or other make-shift methods, and permits setting up for angle work accurately and quickly.

It can be set at any desired angle up to a

full 90 degrees by adjusting it to the proper degree and locking the adjustable supports.

Every part of this vise is accurately machined. The base, body and sliding jaws are of semi-steel castings. The jaws are hardened steel and can be supplied either plain or grooved.

It can be used as a bench vise with or without two different auxiliary bases. Note the specifications below. If your local supply house does not have Palmgren Angle Vises in stock, send us his name and we will see that you are supplied with reasonable promptness, assuming that the order can be placed under the proper priority.

Model	Width #Jaws	Depth Jaws	Opening Jaws	Overall Length	Kind of Jaws	Weight Vise Only	Can be supplied with Model M or Model B swivel base or without base.
000	21/2"	1 7-16"	21/2"	614"	Hardened Grooved	91/2 lbs.	

#### CHICAGO TOOL & ENGINEERING COMPANY

8384 South Chicago Avenue • Chicago, Illinois

Manufacturers of Palmgren Products for Over 25 Years

#### PALMGREN ANGLE VISES

### DESIGNED FOR HEAVY DUTY

#### THE NILSON FOUR SLIDE MACHINE

For Swaging, Stamping, Piercing,



Blanking, Forming of coiled metal. One of the outstanding features of this combination power press and four slide machine is the powerful and silent action of the main press slide which is operated by crank motion through toggle or knuckle joints. Strength and rigidity achieved by overhead stay rods. Changing dies is a simple and quick operation as the removable die set is easily accessible. The gripping members are independently operated, insuring a positive pull on long or short lengths direct from the reel.

Write for further information.

### The A. H. NILSON Machine Co.

Transformer Builders Complete Biggest Job



Employes of a Sharon war plant have completed the biggest job they ever tackled—building 2 electric transformers, each as big as a 6-room house, to handle power for a new aluminum plant.

The 257-ton transformers, built at the Westinghouse Electric & Mfg. Co.'s Division, have been delivered to a utility company to step up electric power from 27,000 to 132,000 volts.

This 5-fold voltage increase provides the most efficient transmission of power between the generating station and the aluminum plant, explained W. G. James, manager of the Westinghouse large power transformer engineering section.

Construction of the transformers required about 188 tons of structural steel, 111 tons of special core steel and 130 miles of copper wire weighing 29 tons. Placed inside the transformer tanks to cool the electrical equipment and provide electrical insulation were 44,000 gallons of oil—enough to fill 8 average railroad tank cars. Each

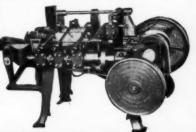
### BUILTFOR SPEED-DURABILITY

### THE NILSON-AUTOMATIC METAL AND WIRE FORMING MACHINE

The Nilson Automatic Metal and

Wireforming machine meets today's industrial requirements. Here are some of the features of this machine. Open construction of press and forming tools, Patented slide feed with an independent cam - operated wire gripping device. Power operating wire feed is transmitted through a straight line.

Write today for information.



### The A. H. NILSON Machine Co.

transformer is 25 feet high, 39 feet long and 24 feet wide.

"Large as the transformers are," said Mr. James, "if they had been built prior to the recent development of a new core steel by Westinghouse, their construction would have required nearly 40 tons of steel, an additional 4 tons of copper and 6,000 more gallons of oil.

The new type core steel, called Hipersil, carries 1/3 more magnetic flux, or magnetism, than any steel formerly used for transformer cores. Because cores of Hipersil can be built smaller, less current-carrying copper wire is required to wind around them, and the steel tank containing the core, coils and insulating oil can in turn be made smaller.

More than 200 men played a part in the building of these 2 immense transformers, and the job took 5 months. It required 6 freight cars to ship each unit to its destination.

#### Cincinnati 0-8 Plain Miller Bulletin

Latest publication announced by Cincinnati Milling Machine Co., details its No. 0-8 Plain Automatic Milling machine as especially profitable in milling small parts in quantity production, such as small arms, typewriters, electrical devices, etc. The machine lends itself especially to battery operation, thru compactness of design, easy operability and adaptation to one-operator, battery control. Dog-controlled, automatic cycles, with rapid changes from one to another are facilitated thru use of cycle-selectors in form of preadjusted camshaft assemblies controlling the functions of operating cycles. The machines may be made with or without automatic rise and fall spindle carriers.

The catalog which is file-sized and 12 paged, gives complete details and specifications. It may be had by addressing the firm.

#### Centers

One of the troubles encountered w i t h ordinary centers has been the difficulty of keeping the m properly oiled Failure to get oil to the point resulted in friction and heating. This in turn caused expansion of the metal at that which point, meant more friction and greater heating. Thus, the trouble tended to build up. Of late. many have been using special centers fitted with helical grooves running down to the center point. Direction of the helix is such that oil is carried pointward by the revolving work. A special oil is used. especially adapted for centers, which will withstand great pressure, allowing the center to be carried tighter against the work.

A great deal of attention has also been given of late

years, to facing centers with some of the super-hard materials now available. You can get new centers so faced, or get the hard-facing material and apply it with the acetylene torch. Advantages of longer wear, obtained through use of some of these materials, are great.

Live centers are available from many sources, and have increased in use greatly, of recent years. Some are de-

## ELIMINATE SPATTER without SMELL or SMOKE!



#### LOOK AT THE DIFFERENCE!

The weld at right needs no grinding, scraping, special cleaning. Spatter wipes off with a damp cloth!



AFTER: Welded with Protect-O-Metal

### GET CLEANER, STRONGER WELDS with PROTECT-O-METAL

Just brush on Protect-O-Metal and weld! Stabilizes and quiets arc, reduces spatter, thus saving costly rod. Increases tensile strength over 2000 p. s. i., on 3/16" plate by removing impurities from weld. After welding, wipe off spatter with damp cloth . . providing clean surface for paint. For single or multi-pass welds. Makes NO SMOKE or ODOR!

Don't judge Protect-O-Metal by any other welding compound. Get the FREE sample—use it—then judge for yourself! No. 2

### FREE

Enough for thorough trial. Write or Wire Dept. 34.

#### G.W. SMITH & SONS 79 S. Sperling Ave.

signed especially for heavy duty.

One has a cup at "point" end of housing. Center itself is fitted with a flange, bearing down toward bottom of cup leaving enough room for thrust balls to run in between the 2 members. V-groove, turned in the edge of center flange, holds packing. Rear end of center rides in bronze bushing. Center is retained in housing by setscrew bearing against a bevel-faced ring turned on center.

### **SURFACE PLATES**

TO MEET TODAY'S PRECISE REQUIREMENTS

PRECISION SCRAPED

Increasing production is placing greater responsibility upon inspection. This in turn is making greater demands for Machine Products Surface Plates because of their recognized precision quality.

Made of Meehanite—an unusual wear-resistant material of dense uniform grain structure—these plates have a smooth, flawless surface. The extra heavy top supported by scientifically-designed ribs assures absolute rigidity and strength throughout the entire plate area.

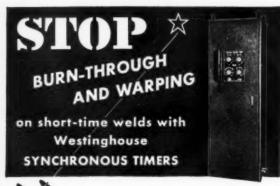
#### ALSO ANGLES AND CUBES

Like the surface plates, these angles and cubes are made of Meehanite and possess the same high quality of precision. The angles have well-formed grips which facilitate handling.

#### MACHINE PRODUCTS CORPORATION

6767 E. McNichols Road

Detroit, Mich.



Random (nonsynchronous) switching of resistance welding current causes as much as 50% variation in the heat produced in short-time welds.

Westinghouse Synchronous Timers deliver uniform heat—prevent unpredictable "transients" which produce many burned, warped or cold welds. They start and stop weld current on the zero point of the wave. Since wave form is identical, all welds are identical in strength and soundness.

Synchronous Timers are essential to uniform production welding of critical alloys and thin materials. They are available for spot, seam, or pulsation welding. Ask your Westinghouse representative for full data. Or write Westinghouse Electric & Mfg. Co., Dept. 7-N. E. Pittsburgh, Pa. J-21191

### Westinghouse

#### RESISTANCE WELDING CONTROL

#### **Brakes**

Sometimes individual machine designers have developed brakes for application to the machine tools in their own shops. Air brakes have been applied to machine tools, tho there appear to be no commercial models as yet available.

There have been cases where clutches have been used for braking service, and there is no reason why most good clutches will not serve the purpose

Application is different, half of the clutch unit being anchored in such a position and manner that it cannot rotate. When brought into engage-ment with the other half, which is on the revolving unit to which it is desired to apply braking action, it acts as a brake. Brakes, therefore, are quite often faced with leather, as clutches are. But high-friction leather, manufactured and treated for this purpose, must be used. Some manufacturers of highgrade leather belting also furnish high-friction leather for clutch and brake facings.

Brakes of band type can use any good straight-line motion for operation. There is an electrical device k n o w n as a Thrustor, which has been used for brake operation to very good advantage. Such de-

vices have been used on the brakes of a wire-stranding machine, tho who built the wire-strander is unknown.

Large, powerful band brakes sometimes generate so much heat thru friction that they must be water-cooled, especially on applications where braking duty is heavy and practically continuous. A huge cable reel, used for paying out and laying submarine cable, and taking it up for repairs, has brake drums over eight feet in diameter.

# DANLY AWIA-ALAMPS



DANLY DIE SETS and DIE MAKERS' SUPPLIES



Boring

There are many aspects to boring, and to various machines and tools used for the purpose. In some cases, high-precision boring makes it possible to eliminate such operations as line-reaming and trial assembly. A case in point is found in the precision boring of bronze bushings in the end shields of electric motors. These have been bored to very high advantage in a diamond tool boring machine. These machines

h a v e been found highly adaptable for boring in parts c o n s i s t - ing wholly or in part of non-ferrous metals.

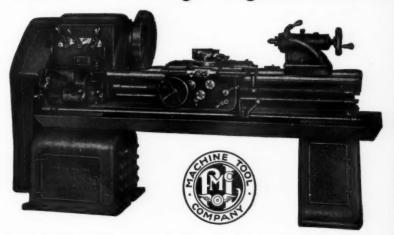
To remove stock from rough bores of long type, so as to bring them accurately the required size, or near enough so to prepare them for honing, as the case may demand, is quite a problem unless one is specially equipped for the purpose. A tool has been designed for this purpose. It is quite adaptable for removing cess stock from long tubing, gun liners, oilfeed shafts with relatively large bores, etc. In cases where no honing is required, but only a true bore, a high satin finish can be applied with

this tool, by traversing it back and forth thru the bore, and reducing speed of traverse at each reciprocation, so as to give it different cutting paths each time.

Like other metal-working operations, where large-capacity jobs are to be handled, boring requirements have often called for special boring machines in order to do the work with economy. This is particularly true in these days of all-out war production.

# Porter-McLeod-

# Screw Cutting Engine Lathe



## 16 Inch-12 Speed-Geared Head-Quick Change

Swing over bed
11, 11½, 12, 13, 14, 16, 18, 20, 22, 23, 24, 26, 28, 32, 36, 40, 44, 46, 48, 52 and 56.

Weight per extra foot of bed.....150 lbs. Largest diameter held in split chuck..%" Lathes furnished with 5, 6, 7, 8 and 10 foot beds.

Engine Lathes Cold Sawing Machines Abrasive Cut Off Machines

PORTER - McLEOD MACHINE TOOL CO., INC. HATFIELD, MASSACHUSETTS

# MAKE YOUR OWN CUTTING TOOLS

with the new

#### COLMONOY WCR ALLOYS

Bridge the gap between high speed steel and the carbides. Reclaim old, and make new cutting tools by welding. The process is simple.

To fabricate a typical tool-

- 1. Undercut carbon steel shank, leaving a fillet for ease in welding.
- 2. Fill undercut, using ordinary hard facing welding procedure.
- 3. Hot wipe, to approximate shape, to save grinding.
- 4. Wetgrind, using green silicon carbide rough and finish wheels.



#### WRITE FOR LITERATURE

Immediate delivery of all grades of W C R Alloys at all branches.

#### WALL-COLMONOY CORP.

720 Fisher Bldg.,

Detroit, Mich.

Branches in New York City, Blasdell, N. Y., Chicago, Tulsa, Los Angeles, and in Canada

Synthetic Tires

Tires whose rubber content is 99.84 per cent synthetic rubber are now being tested on the highways in various parts of the country, according to Dr. Howard E. Fritz, director of research, B. F. Goodrich Co.

In discussing the present relative positions of natural and synthetic rubber from the standpoint of their usefulness in tires, Dr. Fritz emphasized that this testing of high-percentage synthetic rubber casings should not be considered as indicating any early public availability of such tires—that it does not affect the nation's tire supply situation at all.

Experi mental development work done with samples of butadiene-t y p e synthetic rubber -the type which makes up the great bulk of the government synthetics programhas already shown up much that is good and several things that are still unsatisfactory about this new rubber, he said.

Passenger tires and small-s i z e truck tires give excellent service. When we come to large-size truck and bus tires, several difficult problems arise due to the fact t h a t synthetic rubber, while running, generates more heat than natural rubber. and may fail from that cause despite

its higher heat resistance. However, technicians are hard at work on this problem and are confident it can be solved with more experience in the field.

He said that the often-heard question whether synthetic rubber tires will wear as long as natural rubber ones seems somewhat out of place in the present emergency. But experience shows that, under certain conditions, they outlast natural rubber tires.

# AMC DEMAGNETIZER A TOOL ROOM NECESSITY



Every tool room needs this simple, portable, sturdy demagnetizer. Small parts passed through the powerful AMC field are instantly demagnetized. Large, flat surfaces can be demagnetized by sliding the device over the surface.

Price is only \$32.50, complete as shown.

Write for full information.

ALOFS MFG. CO., Grand Rapids, Mich.





We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

Write for bulletins.

ZEH & HAHNEMANN CO. Newark, New Jersey

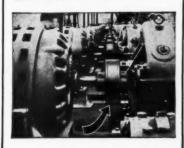


# THEY HELP YOU Maintain Peak Production

With your machines now forced to the limit to gain peak output, the necessity of stopping for repairs becomes much greater. You can prevent many of these costly interruptions of production by using KANTI-LEVER Couplings, for they have a scientifically designed Cushion Torque that absorbs sudden load shock and torsional vibration -- the two main causes of wear, fatigue and failure of machinery. The KANTI-LEVER is different from any other type aud gives your machinery a protection that is vitally needed under present abnormal conditions. See cut showing 70 KANTI-LEVERS that have proved invaluable to their user by protecting the driven machines and enabling steady production for over 18 years.

Send for Bulletin 28-B describing

## Kanti-lever Couplings



BROWN ENGINEERING CO., 126 N. THIRD ST. READING, PA. Machinists-Tool & Die Makers-Sheet Metal Men-Pattern Makers-Get...

## FREE SAMPLE TAMMS BLUE LAYOUT DOPE

Speeds layout time on brass, aluminum, copper, tin, stainless steel. Won't chip, crack, or flake off. Comes in handy 8 cz. bench type brush-in cans. Also pts., qts., qts., dts., drums. Send for sample now!

Tamms Silica Co. 228 N. LaSalle St., Chicago, Ill.





UNIVERSAL VISE

Save tooling time. Build your fixtures around a completely pre-designed drill jig body.

Save production costs. Savings up to 60% in drilling time not uncommon. Lever locks work instantly—holds securely. Throw it back and work is released. No complicated adjustments. Save cost of expensive drill fixtures—just a bushing plate and adaptor needed for each job.

Order today. Please include contract number or priority certificate. Write for bulletin.

Mohr Lino-Saw Co.

130 N. Union Ave.

Chicago, Ill.

# Geared For Victory Gear Specialists

- SPUR
- WORM
- BEVEL
- . HELICAL

The Taylor Machine Co.



1917 EAST 61st ST., CLEVELAND, OHIO

"TAYLOR - MADE"

# OPEN THE WAY TO GREATER PROFITS

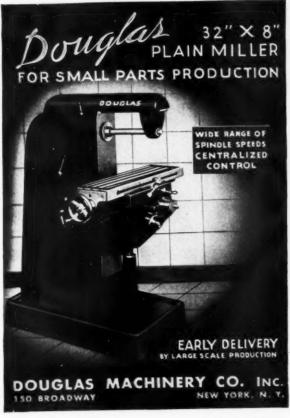
BUTTS AND CONTINUOUS LENGTHS — for GUARDS — CABINETS — CASES — BOXES — LUGGAGE
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S & S MACHINE WORKS

HARDWARE DIVISION

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CHICAGO, ILLINOIS



**Calipers** 

An adequate supply of calipers, perfectly adapted to the work being handled in any given shop, is foundational to an accurate and a productive shop schedule. You may argue all day to no profit as to whether the anvil of a screw thread micrometer should be fixed or movable. The fact is that some of our foremost caliper manufacturers will furnish you a micrometer either way you want it. However, they are usually sent with a movable

anvil, unless otherwise ordered.

Do you know that a considerable number of shops are now using micrometers fitted with wooden handles, extending at right angles to the micrometer screw? Handles are applied to certain micrometers by one builder, and serve to keep the hand a couple of inches farther away from hot metal being measured. Other shops micrometer use stands for certain work, where it is more convenient to bring the work to the micrometer, than it is to bring the instrument to the work. The stands hold the tool at a convenient angle for application of the work. Another thing being done by some, is to send micrometers in to have tips of carbide applied to them. It extends the life of the wearing surfaces.

Calipers enter into modern machine design, as you have probably noticed. An outstanding case in point is an automatic type of surface grinder, with revolving table or chuck, fitted with 2 grinding wheels, 1 for rough and the other for finish grinding. The workpieces ground are gaged by the individual control calipers as they leave each wheel, and the arrangement is such that the caliers maintain the wheels at a fixed height, to hold a specified size within close limits.



We are proud to announce that out of their own pockets, the employees of Universal have bought and paid for a \$50,000.00 U. S. fighter plane. And this, mind you, they have done in addition to pledging 20% for War Bonds.

We are proud too, of our Universal Drill Bushings which are straight and round, and have superfinished bores for accuracy and long life. Write today.



UNIVERSAL ENGINEERING COMPANY FRANKENMUTH, MICH.



#### Acro Kutrite Fixture

Worthy addition to the welcomely rising number of appliances which simplify otherwise delicate operations so that the inexpert can get expert results, is this fixture, Kutrite, just described in new literature by Acro Tool & Die Works, 5324 N. Kedzie Av., Chicago.

The device is said accurately to position milling cutters on the surface grinder at correct angles for grinding sides and faces of cutting edges, and is claimed to be equally accurate for holding circular saws, side-cutting, gear and forming and many other cutters . . . jobs formerly requiring highlydeveloped skill.

Made of high grade steel, hardened and ground to close tolerances, with angles adjustable and easily changed from side-grinding to end-grinding position. Takes cutters up to 6 inches in diam. . . and even larger, when vise-clamped and elevated. Fits 7/8 and 1" holes, with larger sizes available on special quotations.

The descriptive circular, available from the firm on request, gives full specifications, backs up claims with a definite guarantee, and gives an impressive list of users among nationally-known firms thruout America.

"KEEP 'EM ROLLING"

# TIME SAVER

These interchangeable steel type and holders make part number changes a simple operation. Turn a screw to make the change.

Guaranteed for years of service.

Used by hand or press, it's a time and money saver.



25 CENTRE ST. COSCNED 26 BROADWAY



SOUTHWEST MFG. CO., 1623 EAST FIRST ST.-Dept. B

\$100 POSTPAID



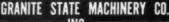
A simplified, precision tool for milling, boring, facing and routing small parts for instruments and arms, munitions, etc.

Spindle dia. at driving end, %, 1150 and 1750 r.p.m., 5 Speeds. 12" longitudinal travel of table, 7" cross travel, 4" Spindle feed.



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# TO INSTRUCT NEW MEN IN THE HANDLING OF DIAMOND TOOLS

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# KAEBELITE

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for all Industrial Purposes.

#### Severance Forms New Tool Firm

Formation of a new corporation, known as Severance Tool, Inc., to take over operations of all Severance Tool Co., service branches, has been announced by R. M. Severance, owner of Severance Tool Co.

The new corporation will have facilities in all its plants, to handle regrinding, sales and service operations on Severance "Midget Milling Cutters," and other high speed steel cutting tools designed and originated by Mr. Severance.

The plants which become a part of the new corporation are located at Los Angeles, New York, Chicago, Detroit and Fort Wayne; and a new plant is being opened at Springfield, Missouri.

R. M. Severance is chairman of the board of the new corporation and the officers are:—President, John A. Wright, Saginaw: Vice President and Treasurer, George E. Hedberg, Bay City; Secretary, E. Elmer Staub, Detroit. Main offices are in Saginaw, Mich.

# A Finer Place to Stay

## FORT MEIGS

250 WITH BATH FROM \$2.50

The superiority of Fort Meigs Hotel is attested to by experienced travelers who appreciate its beautiful, comfortable accommondations and reasonable rates. Purple Cow Coffee Shop and Maritime Buffet serve the best food in Ohio.

EDWARD SHERMAN, Manager

St. Clair between Madison & Jefferson

TOLEDO

ONE OF THE ALBERT PICK HOTELS

# QUADRO PRECISION LIVE CENTERS

## 5 REASONS Why They Meet Every Specification:

- FOUR (4) ROWS of precision BEC-4 specification bearings.
   Note SHORT OVERHANG assuring rigidity and accuracy\_climinates "chatter"
- 3. Positive FELT-SEAL\_excludes dirt\_retains lubrication.
  4. HARDENED AND GROUND CONE—point accurate to within

7	DUT	
	Comb	
	dial Load	
	R. P.	200

A	В	c	D	E	Radial-Threat Lead Ac 100 E.P.M.	Not Price
1%	36	*	146	2%	3600	\$23.00
1%	34	%	111/10	3%	3300	\$25.00
21/12	1950	1968	14%0	4%s	7500	\$35.00
2%	1%s	1	2%s	5%s	12000	847.00
	1% 1% 2%s	1% % 1% % 2%2 1%s	1% % % 1% % % 2%s 2%s 2%s 2%s 1	1% % % 14% 1% % % 11% 2%: 1%: 14% 14%	1% 36 % 11% 2% 1% 36 % 11% 33% 2% 11% 36 14% 4% 2% 11% 12% 5%	A B C D E Radial-Threat Land Act 100 R.P.M.  1% % 11% 2% 1600  1% % 11% 3% 3% 3300  2% 11% 11% 48 7500  2% 11% 1 2% 5% 12000

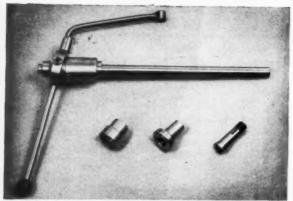
All orders must be accompanied by extendable priority

FISHER TOOL CO.

226 LAFAYETTE STREET NEW YORK CITY



## Collet Closing Attachment



#### IMMEDIATE DELIVERY

Make a production screw machine out of your engine lathe. Western Aero's quick-closing draw in collet attachment permits the feeding of material through the head stock without stopping the lathe.

The attachment has a positive ball lock ... fits Atlas, Logan, South Bend, and similar laties. Completely enclosed mechanism.

Order direct or see your local supply dealer.

Spindle Hole Collet Price

Lever Cross Slides also available at \$42.50 Dealers write for information

#### WESTERN AERO PRODUCTS CO.

211 WEST PALM AVENUE . BURBANK, CALIFORNIA

Broaching

Among many broaching problems that come to industry, there is an occasional one which involves work of very close tolerance, demanding that wear on broaches be held to an absolute minimum. One such job which has been noted is the slotting of pump rotors by a certain pump works. An accuracy within .091 was required on these slots, and it was found that broaches would slot only 25 or 30 rotors

before there was enough wear in the broach to disqualify it. Tool costs naturally ran extremely high.

Then, it was discovered that by taking the worn broaches and chromium plating them. could enough be added to their overall size to allow grinding them down to exact original width. Further. the chromium - plated broaches stood up better, slotting 8 or 10 additional rotors. Since broaches could b e reclaimed again and again, a great saving was realized.

The advances that have been made in broaching practice are almost unbelievable. Broaching machines of full - auto-

matic type, which require no operator have been developed for certain types of work. One such, developed for broaching bushings from seamless steel tubing, receives workpieces from cutting-off machine, thru a tube on the front of the broaching machine, the tube mentioned serving as a magazine. An automatic slide moves the workpiece into position for broaching, and the broach ascends thru the workpiece, actuated by a hydraulic cylinder in the base.

#### MARSCHKE'S finest feature . . "DEPENDABLE DURABILITY"

Significant is the fact that Marschke Grinders which were in service during World War I are working in war production today. This experience has resulted in "dependable durability" - long life and economical service—that can't be beat today.

Over 70 specifications of Swing Frame, Floor Stand and Pedestal Grinders—and Buffers—1 to 25 HP, 10° to 30° wheels.

Write for the Marschke Catalog, to VONNEGUT MOULDER CORP.

"GOOD Machinery is the best investment . . . always"

1805 Madison Ave., Indianapolis, Ind.

**GUT MOULDER** CORP INDIANAPOLIS



GLAMOUR GIRLS OF 1918—Here are samples of approved 1918 styles, vorm by girls operating drill presses at one of General Electric's plants at that time.

# -ABRASAW-

BRIDGEPORT NO. 47W WET CUT-OFF MACHINE



More, better and cheaper cuts on practically all materials, are produced by the new Bridgeport "Abrasaw". Cutting speeds are unbelievably fast, material is handled with facility and the polished cuts often eliminate secondary operations.

LET US SEND BULLETIN GIVING DETAILS.

# BRIDGEPORT SAFETY EMERY WHEEL CO.

1304 W. BROAD ST. INC. BRIDGEPORT, CONN.

#### An Improved Model Index

A new model Index milling machine is in production, providing heavier column, knee, saddle and table.

Being sensitive enough for jobs requiring end mills of approximately ½ in diameter and sturdy enough for cutters up to ¾ in diameter in tool steel, they make excellent machines for cavity and contour work.

The spindle runs in precision ball bearings packed in special greases so that no attention is required for a couple of years at least. Quill travel of 3¼" with power feed is provided; No. 9 Brown & Sharpe taper; spindle head swivels 90 degrees right or left.

Table is fitted with verniers, cross and longitudinal. A piece 8 x 16 in can be worked, milling, drilling and boring straight or at angles all in one setting. Available speeds are fast enough for small end mills and slow enough for boring holes up to 3" in steel.

The makers say that many plants are using batteries of Index machines on production of parts for guns, aeroplanes, instruments and all types of precision war work.

Sales and distribution are handled thru Blank & Buxton Machinery Co., Jackson, Mich.

#### Hard-Surfaces Worn Parts

With full-speed war production taking its toll of machine tools the problem of replacement and reclamation mounts accordingly. Low-temperature welding, as advanced by Eutectic Welding Alloys Co., 40 Worth St., New York, is gaining increasing attention, in meeting salvaging needs in replacement of worn parts, says a bulletin, No. 185, available from the firm. It gives details regarding its Castolin Eutectic (Low-temperature) Welding Alloys, together with applications and full specifications, aimed to acquaint the general trade with the advantages claimed for the welding method.

#### Starrett Tools Catalog

New Catalog No. 26 is off the press and ready for distribution, according to L. S. Starrett Co., Athol, Mass. It's handy pocket-sized, runs to 282 pages, and lists the entire line of mechanics' tools and accessories made by the firm.

## Cathes COLBORNE SPEED-UP FINAL OPERATIONS ON DIES, GEARS, SCREWS LONG RODS, SHAFTS

GOOD DELIVERY

For economical polishing, lapping or finishing of gears, shafts, dies, gages, ball races, long rods, etc.

Built to meet the requirements of those desiring a heavily constructed, smooth running machine of highest quality.

Has one H.P. built in motor with variable speed control, using REEVES standard pulley and belt.

Smooth automatic brake acts instantly when switch is thrown,

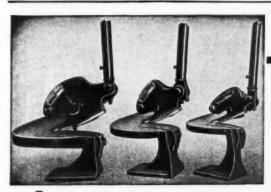
Collets or chuck may be used.

Write today for details

Machinery builders since 1879.

#### MFG. COMPANY

57 W. DIVISION ST., CHICAGO, ILL.



Get BEVERLY Throatless SHEARS

#### SAVE TIME ON WAR ORDERS

If you're cutting straights—rounds or irregulars on War orders you can speed 'em up and eliminate distortion with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16 mild steel and 10 ga., stainless.

BEVERLY SHEAR CO., 3005 W. 110th Pl., Chicago, III.



Victor Saw Works, Inc. advertisement on front cover of "American Machin-ist" for February 4, 1932.

Ten years ago, the first molybdenum alloy hack saw blade-introduced by VICTOR-was the sensation of the metal cutting industry, bringing tungsten high speed steel performance at half the cost.

Today, the molybdenum alloy blade is the salvation of the metal cutting industry, for today's VICTOR "Moly" High Speed-ahead in steel analysis and heat treatment-is maintaining and accelerating production schedules for those accustomed to the use of other high speed steel blades.

Whenever you buy molybdenum alloy blades, be sure you get the original, genuine VICTOR "Moly"3 High Speed, easy to identify by its all-over gold metallic finish.



\*T. M. Reg.-Blades bearing the name "Moly" are souly by Victor Saw Works, Inc. and affiliated compa

⊕ 58I

# SAVE 1/3 to 1/2 on CENTERS

- No skim-over
- · No out-of-rounds
- No lead. No poison
- · No grit
- · No drying

CENTER Lube takes the place of lead, is cheaper, made specially for lubrication. Used for tapping, broaching, drawing,

since 1923.

WRITE FOR SAMPLE

JUDD SPECIALTY 3805 Library Ave.,

COMPANY Cleveland, O.

#### Polisher-Buffer



Mounting the motor inside base of this heavy-duty polisher-buffer, says the maker, Hisey-Wolf Machine Co., Cincinnati, O., permits use of standard open motors instead of enclosed, fancooled motors, thus saving critical materials.

The machine is built in single-spindle, single motor type, as well as 2motor type, with motors from 3 to 10 hp. Oil lubrication with minimum attention is a feature of the constantlevel oilers. Both open and encased type spindles are available, latter with housing about spindle extention and ball-bearing directly adjacent to the wheel.

Full details and specifications may be obtained by addressing the manufacturer.

# BALDOR BEARING GRINDERS

## STURDY BUILT

for Long, Hard Service





#### ASK FOR BULLETINS ON COMPLETE LINE

Above: Baldor Special Carbide Tool Grinder, ½ b. p. ball-bearing motor, 6\* Silicon Carbide wheels, Ask for Bulletin 305;

At left: BALDOR No. 803, ¾ h.p. ball-bearing motor, 8° wheels;

Ask for Bulletin 307;

\$60.00

BALDOR ELECTRIC COMPANY 4368 Duncan Ave., St. Louis, Mo.

**Hundreds of Users Prefer** 

Tool BITS

"GOING IS

Use Gold Tip and Blue Nose Bits on tough jobs like this and watch results.

CENTER DRILLS . . . LATHE MANDRELS DOVETAILS . . . KEYWAY CUTTERS FORM GROUND TOOLS

Send for Catalog



14236 Birwood,

Detroit, Mich.

Specially treated to Rockwell "C" 62-65, and are not hrittle.

Actual photo of Tru-Cut Gold Tip Bit. 11/16 cut. .020 Feed, 1020 SAE Steel.



Every minute counts today in production. Yes, time counts now, including all the time spent by Yankee workmen at their benches in the past century—a priceless heritage in metal-working. All-out for the war effort, RTTCO is using its long experience to utmost effect.

SPECIAL BOLTS, NUTS and STUDS DROP FORGING and DIE SINKING SCREW MACHINE PRODUCTS HEAT TREATING SPRAYED METAL SERVICE

> Estimates gladly submitted. Send samples or blueprints. Catalog on request.

#### RHODE ISLAND TOOL COMPANY

148 West River St. Providence, R.I.

Serving American Industry Since 1834

RITCO

#### Despatch Oven Bulletin

Listing and illustrating its complete line of gas, oil and electrically-fired heat treating ovens, the new bulletin by Despatch Oven Co., 722 Central Ave., Minneapolis, contains much that is valuable in the way of heat treating information. Every oven listed is exhaustively detailed as to qualifications and specifications. The firm is reporting new records of accomplishment for its products, under stress of war production, citing numerous prominent war-production firms who are users of the Despatch product.

Also explained in the bulletin is the Despatch line of material handling systems, said to permit more satisfactory handling of aluminum castings. Quenching of a load in 24 seconds is claimed for the new equipment.

Bulletin is file size, in two colors, amply illustrated. It is available to interested parties by addressing the

Finest
DOWNTOWN
Location
HOTEL OHIO

The Ohio provides you with greater comfort and a cordial atmosphere. Good beds, good food and economical rates assure you of the best in hotel enjoyment during your stay at Hotel Ohio.

400 ROOMS FROM \$2.

**YOUNGSTOWN** 

ONE OF THE ALBERT PICK HOTELS

#### Blanking

Blanking parts from sheet metal will always be a verv important phase of the metal working industries. It is interesting to note rewhich finements have been applied in different blanking press operations. There is the matter of obtaining a count on the number of parts blanked. thru application of counting machines to blanking presses. Manufacturers of these little counting machines are always ready to give instructions for their application to older machines, and most new ma-chines have some sort of counting device applied.

There is the proposition of automatic feed for blanking presses, which is now very often applied in cases where parts are being progressively blanked from coiled strip stock. There is one

manufacturer of automatic feeding devices for coiled strip stock who also furnishes the necessary reel stand to hold the stock, so that automatic feeding devices may be applied to almost any punch press. On the other hand, there are also manufacturers of splendid presses, who are in position to furnish their own automatic feeding devices.

In general, better design and workmanship go into the making of present-day blanking presses, so that, in

# Infinite Positions



No other clamp is as flexible in its applications... in closed position, the clamping bar has infinite adjustment up to 15° below and above horizontal... yet you can't shake open the new PEC drop forged jig clamp. Because of the exclusive PEC self-adjusting feature (which operates like the slotted aper-

ture on a pair of pliers) it is now possible to carry a much smaller stock, as one PEC is adjustable to do the work of many ordinary nonadjustable jig clamps.

Write today, outlining your requirements, and complete information on this new PEC jig clamp will be rushed to you.

SELF-ADJUSTING...QUICK-ACTING...INFINITE POSITIONS...DROP FORGED...POSITIVE LOCK



most cases, by installation of modern equipment, many of the troubles experienced with older models disappear. One manufacturer of a fine line of blanking presses uses cranks of chrome molybdenum steel, and has machines to offer with capacities varying from 5 to 70 tons. Different builders offer inclinable presses. By setting the press up with the bed on an incline, the workpieces will drop away by gravity.

(EDITORIAL NOTE: Identities of machines mentioned given on request.)

#### SUPERIOR AIR POWER ON PRODUCTION FRONTS

... That's what it takes to drive dust and dirt out of machinery and equipment, before those saboteurs can cause damage. Ask your Mill Supply dealer or write us about .... All armed services and war production plants use Cadillacs.



Inquiries invited for universal type 1/50 to 1 HP motors.

CADILLAC

PORTABLE ELECTRIC COMBINATION

BLOWERS AND SUCTION CLEANERS

CLEMENTS MFG. CO. 6651 S. NARRAGANSETT AVE., CHICAGO, ILL

#### Strain Gage Bulletins

Three new technical bulletins, one describing the company's CR-4 Strain Gage and the other 2, the recording and indicating instruments for use with SR-4 Strain Gages, have just been issued by the Baldwin Southwark Division of The Baldwin Locomotive Works, Philadelphia.

The bulletin on the SR-4 Strain Gage, describing what is said to be an entirely new and revolutionary method for determining stresses in structures and machines, gives detailed descriptions of the 3 standard gages, their application in measuring and recording dynamic and semi-dynamic strains, and instructions for installing the gages on structures to be analysed.

Contained in the 2 other technical bulletins, the SR-4 Strain Recorder and the SR-4 Portable Strain Indicator, are detailed descriptions of the 2 instruments, and installation operating information for their use with SR-Strain Gages.

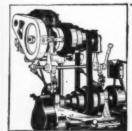
#### **Dupont Lucite Manual**

Methods of fabricating "Lucite" methyl methacrylate resin into airplane enclosures and other products are described in detail in the new illustrated manual on "Lucite" for aircraft issued by Plastics Department, E. I. du Pont de Nemours & Company.

Information on care and handling, sawing, blanking and punching, drilling, threading and tapping, routing and shaping, sanding, scraping, finishing, cleaning, cementing, forming, mounting and installation, and repairing of "Lucite" is contained in the manual.

Together with pictures and diagrams illustrating these various operations, the manual has complete listing of mechanical, thermal, optical, electrical and general properties of the plastic.

Copies of the manual will be sent by the Plastics Department of the Du Pont Company at Arlington, New Jersey, to executives, business men and engineers who request it on their business letterheads.



## Want a Quiet Shop?

You'll find changing speeds a noisy operation with many drives. That is the big difference between a Remco and the others. A Remco is quiet. Motor takes hold gradually by slipping the belt—simple friction-clutch action. No clash, no crash, of metal-on-metal. Instead shockless speed changes made without removing tool from cut in most cases. Less down-time, more out-put! Write! Remco Products Corp., State St. at R. R., York, Pa.

#### REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

#### Bearings

The recent government order restricting tin in white metal bearing alloys to 12%, does not, according to Dutch Boy Quarterly (Na-tional Lead Co., 111 Broadway. New York.) mean inferior bearing perform-Practical ance. experience has shown that, for a large number of general babbitting purposes, a correctly alloyed lead-base metal often proves as service a b l e as more costly tin base. Only in a minority of cases are the 2 types of alloy not directly interchange-Tin-base babbitt stands up a little better in bearings where operating temperatures are high, where high speeds and heavy loads are encountered, says the article. Even in such

cases, modification in design sometimes makes use of a lead-base babbitt practicable. This has been proved in the automotive field where, mainly due to lessened thickness of bearing linings, lead-based babbitts have replaced other alloys.

Since issuance of WPB's tin-conservation order, quite a few lead-base alloys have been developed. Some are so-called "general-purpose" babbits of standard composition, which have been in use for some years. Others are newly-developed, usually for a specific



## This NEW BULLETIN

gives you the latest information, recommendations, diagrams, listings, prices, etc., on the broad line of Gits Oilseals and Greaseals, which are widely used in today's mechanized warfare. They provide positive bearing protection under all conditions. Your FREE copy is ready for mailing—write for it.

## GITS BROS. MFG. CO.

1860 South Kilbourn Avenue • Chicago, Illinois

30 years of oil cup experience

end, and with little or no background. From the standpoint of the general user, Dutch Boy Quarterly points out, replacement with a standard, general-purpose, lead-base babbitt is safer procedure than experimentation with an alloy which may not meet requirements.

National Lead Co.'s Dutch Boy, Perfection Anti-Friction Metal, the firm claims has the hardness, crushingstrength and other physical characteristics sought in a general-purpose babbitt.

## POWERUNATION



Has These Outstanding Advantages

- 1. Automatic Governor Control
- 2. Correct Belt Tension over entire speed range.
- 3. Speed can be changed while cutting
- 4. Preset Speed Control
- 5. Automatic Return to Low Speed
- 6. One Speed Control within easy access

Ask for Bulletin No. 124

## POWERMATIC MACHINE CO.

659 So. Anderson St. LOS ANGELES, CALIF.

# DELIVERY TODAY!



Castings shipped immediately, plain or semi-finished, on low priority. Used for WAR WORK where expensive, large equipment is not required. Ample capacity for hundreds of operations on small parts.

SIMPLE OPERATION— EXTREMELY LOW IN-VESTMENT make this an ideal tool for unskilled operators.

Table size — 3% × 18°. Longitudinal travel — 12°. Vertical travel—7°. Transverse travel 5°. Weight completed — approximately 180 lbs.

MACHINE TOOL CO. College

You can build this mill far more quickly than you can get delivery on

Dept. T-12

P.O. Box 116, Sta. A, Los Angeles, Calif.

Ryerson Centennial Brochure

There are many close parallels in the historical development of our country and of the House of Ryerson. have been woven into an unusually attractive and especially interesting brochure recently issued by Joseph T. Ryerson & Son, Inc., Chicago. The title is "100 Years of Peace and War" and many of the main illustrations are worthy of enlarging and framing. The many incidental thumbnail sketches dress up the pages and portray the highlights of important historical happenings, related more or less directly to milestones in the story of Ryerson. An especially interesting feature is a chronological table of historical events by decades from the "40's" up to the present. In every way, the brochure is a worthy contribution to trade literature and it will add to Ryerson prestige.

Metal-Cutting Band Saw

A band cut-off saw, said by the maker to cut practically any metal found on the average stock-rack, accurately, speedily and efficiently, is described in a circular by Johnson Mfg. Corp., 5000-4 Chrysler Bldg., New York.

Adaptability and flexibility in handling rods, tubes, angles, heavy rounds, flats and irregular shapes, up to 10x 18-in, efficiently and economically, is claimed to be almost limitless. Because it is continuous, cutting action is fast, giving a smooth, quiet cut, with no inertia to overcome and no heat generation, the firm points out. Heavy frame, rugged bed, wide guide-rolls and careful balancing make for extreme accuracy.

Nationally known Cutting Tool manufacturer has opening for Sales Representative in Rocky Mountain, Texas and West Coast Territories. Replies treated confidentially.

#### TRU-CUT TOOL CO.

14236 BIRWOOD AVE., DETROIT, MICHIGAN

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S.

NAVAL AIRCRAFT FACTORIES

#### BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10° Table; Model E.L. 12° Table;

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IMITATIONS!

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# DESMOND GRINDING WHEEL DRESSERS and CUTTERS



We can supply you with the proper Dressers and Cutters for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

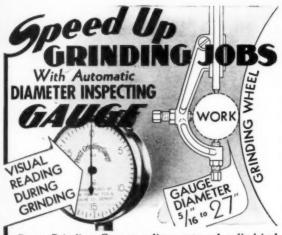
# SIMPLEX Steel Slide VISES



A full line of Machinists' Filers, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

The DESMOND-STEPHAN MFG. CO., Urbana, Ohio



Pratt Grinding Gauges caliper external cylindrical jobs while work is in motion or at rest. Adapted to straight or tapered work. Tolerances of .0001" plus or minus easily maintained. Visible check on out of roundness, rough grinding and chatter. Cannot grind work undersize unknowingly. Easily installed on any grinder. Pratt Grinding Gauges increase production, eliminate scrap and assure accuracy. A modern precision tool, ruggedly built.

DIAMOND TOOL & GAUGE CO.

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#### Air Conditioning

Refrigeration and its partner, airconditioning, have now assumed new industrial roles in mechanized war. They will open untold fields, when hostilities cease. Refrigeration plays an important part in precision production. A fine machine tool, working to within a ten-thousandth of an inch, cannot turn out the same-sized article during a cool night shift, as during a hot afternoon. To do so, the temperature around the machine must be stabilized.

Otherwise fluctuations in temperature will cause enough changes in sizes of parts to disorganize any assembly line.

Modern, safe, windowless factories are possible only because of advances in air. temperature humidity conditioning. Tips of spot-welding machines heat up quickly. Refrigerating them keeps them going steadily. without need of outages for cooling off. Airplane ments must be checked and inspected under conditions actually met in the air. Refrigera tion is important here. In making fine lenses, explosives, drugs and chemicals, and even in blast furnaces, elements of air-temperature-humidity conditioning play vital parts.

Refrigeration equal to that produced by melting millions of tons of ice is accomplished by a compact unit, every 24 hours, in a new DuPont synthetic rubber plant, where many degrees below zero are required for

the making of a necessary ingredient. A small amount of the refrigerant replaces fantastic quantities of ice, says the firm. But, more important, is heat and humidity control without which essential war production would be slowed if not stopped.

# A CLAMP for Every Purpose



Forged Steel Quick Acting Deep Reach Welders





Sizes Available: 34" to 10' opening 1/2" to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop. IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE., CINCINNATI, OHIO

## WATER removed from WITH THE MURPHY SEPARATOR



Sizes 1/2" to 4" Pipe Literature and Prices on request. RESULTS - - - GUARANTEED NO ABSORBENTS - NO CHEMICALS

JAS. A. MURPHY & CO. HAMILTON, OHIO

#### MAKE SPRINGS

Blaner Universal Hand



Here's a profitable tool room unit, Quickly makes hundreds of sizes of springs. Sturdy, depend-able . . . a real time and money-saver.

Illustrated is No. 4 Universal with adjusting shaft of % square. Takes wire up to ¼ diam. Patent No. 2052443 Write for your Circular.

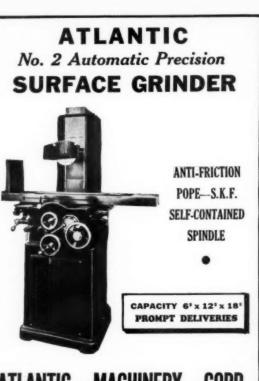
Corner Meek & Elm, Sharon, Pa.

Paper Work

With a manpower shortage menacing American war production, every manhour saved means increased output of ships and guns and planes needed to defeat the Axis powers. Recent elimination or simplification of 40% of WPB requests for data industry. from will save at least 30 million manhours yearly. The equivalent of at least 15,000 men, working every week of the year, will thus be released from unnecessary a n d costly paper work for more produc-tive pursuits.

This estimate of the savings accomplished in the last three months thru the combined effort of industry represent and various WPB units, coordinated by WPB Committee on Data Requests, is conservative. The time and effort consumed in re-

plying to forms and questionnaires can reach huge proportions. For instance, one large automobile company complained that the preparation of forms in hand at one time cost \$125,000 and would consume more than 100,000 man-hours annually. Altho these are admittedly extreme cases, they indicate that the estimated average saving of 200 man-hours per year for each of the 150,000 concerns affected—a total of 30 million man-hours nationally—is cer-



ATLANTIC MACHINERY CORP.
149 BROADWAY, NEW YORK, N. Y.

tainly not too high.

This man-hour saving involved in the Committee's elimination of 120 forms affecting 25,000 companies, and the substantial simplification of 132 more affecting 125,000 firms is only part of the story. The benefits can also be measured in terms of dollars, of accelerated production, and of lowered executive blood pressures, benefits which loom significantly in America's all-out war effort.

#### **ERRINGTON MECHANICAL LABORATORY**

MAIN OFFICE AND WORKS: STATEN ISLAND, NEW YORK

Chicago Office: 6422 N. RICHMOND STREET New York Office: 170 BROADWAY



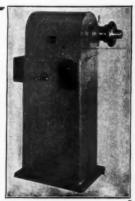
## 24 hours...every day

with

## Schauer Speed Lathes

SCHAUER Speed Lathes are made to withstand the strain of twenty-four hour production:—all wearing parts are of hardened tool steel—machine ground for precision fit—and assembled by experienced men. For faster, more economical finishing operations of machine parts use SCHAUER Speed Lathes—send for Catalog No. 420.

SCHAUER Speed Lathes with Slogren Chuck—increases output of finished screw machine parts up to 1\% dia. Size of collet is quickly adjusted by hand wheel.



"the originators of today's Speed Lathes"

SCHAUER MACHINE COMPANY

**2064 READING ROAD** 

CINCINNATI, OHIO



JACKSON
MACHINE & TOOL COMPANY SALES DIVISION
956 Roberts St. Jackson, Michigan

#### Centering

spindle capacity 8' x 32' table.

All centering problems are important. A small error can do much damage or cause a great deal of extra work. Whether you use the ordinary type of machinist's center punch for marking hole centers, or an automatic center punch, it will pay to exercise great care.

There is some advantage, on different kinds of work, in making marks of different depths. For this reason some prefer the ordinary punch which can be hit with a hammer, to regulate depth of the marks by the force of the hammer blow. However, there is an automatic punch adjustable in length of stroke, simply by turning the cap, making it widely adaptable.

If you are producing parts in turret lathes or automatic lathes, which are to be ground later, you can machine to closer limits if you use a thoroly competent centering machine. This machine is supplied with bellmouths of different sizes which can be used for different diameters of work. T h e workpiece, with the end held in the bellmouth, is center drilled while in that position, the drill advancing thru the bellmouth for the purpose. Under this arrangement, the work is so accurately centered that very little stock need be left for final grinding, when the preliminary machining is

done. For centering work on milling machines, an optical centering instrument has recently been announced.

Certain types of work which must be properly centered really demand a special machine for the purpose, if it is to be done on a production basis.

Anyone can see at once the importance of having the hubs of steel wheels, for example, bored concentric with the wheel-rims, whether hub itself is accurately centered or not. Hence, many wheels are center-bored, gaging the bore from wheel-rim.

GRINDALL EXTERNAL GRINDER . TOOL GRINDER . INTERNAL GRINDER GENTLER Model B

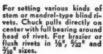


THREAD GRINDING MACHINES PORTABLE PRECISION GRINDERS BALL BEARING SPINDLES

General Machine Tool Co. SENECA FALLS
NEW YORK

WHITNEY- JENSEN PRODUCTS

#### BLIND RIVET PULLER



WRITE FOR Whitney - JENSEN AIRCRAFT TOOLS CATALOG



WHITNEY METAL TOOL COMPANY



To hold parts together for operations such as drilling, or riveting, Knu-Vise Pliers have proved exceptionally efficient because there is no time wasted in fastening or releasing them. One flip of the lever applies the required pressure and another flip releases the work just as quickly. Holding of work is simplified and production is stepped up. Let us show you efficient methods of holding parts for speedy production.

Send for new catalog.



1334 PLUM ST., DETROIT, MICH. 4328 SAN FERNANDO RD. GLENDALE, CALIF. Brown & Sharpe Catalog

Small Tools Catalog No. 34, listing Machinists' Tools. Milling Cutters, Hobs, Arbors, Adapters, Collets, Etc., has just been released by Brown & Sharpe, Providence, R. I. Listed, also, are Screw Machine Tools, Pumps and miscellaneous items made by the firm.

Accompanying the catalog is a list of items temporarily withdrawn from Catalog No. 34 as well as Catalog No. 142, due to the present emergency and the demand for small tools taxing

the firm's capacity.

The volume contains in excess of 500 pages, and, in addition to describing the various items, gives much information as to employment and application, with tables of standards and other useful information.

Key people in plants, etc., may have a copy by addressing the firm.

#### **Duro Offers Compact Table**

A new 6 inch rotary table, small enough to fit into usually inaccessible places, is now being produced by the Duro Mfg. Co., 800 E. 61st St., Los Angeles, Cal.

Faster rotation is possible as the new Duro Rotary Table has a worm gear ratio of 60 to 1-giving a 6 degree rotation for one turn of the crank. This ratio is versatile for tool making, layout, inspection and production. Back lash is said to have been eliminated by an eccentric adjustment between the worm and gear.



Easy reading is assured with a beveled dial accurately cut and graduated to tenths of a degree.

Two T slots cross at 90 degrees, forming 4 quadrants. A T lock screw is provided for fixing the position of the table. The table's center hole is 58 inch in diameter. All moving parts are easily lubricated.

The table is of seasoned semi-steel, heavy construction with an attractive finish. Height is but 21/8 in. and net weight is only 141/2 pounds.



FIRST .. on your list of "musts" for better, quicker work

#### PORTELVATOR

Portable Elevating Table

Man-power lifting is old-fashioned . . . lift the modern, easy, automatic way. Use PORTELVATOR, too, for overhanging work, for supporting work, for hundreds of odd jobs. Capacity up to 20 tons.

Get details from Dept. B-1

HAMILTON TOOL CO

Ninth and Hanover Streets. HAMILTON OHIO



#### ADJUSTABLE HOLLOW MILLS

16 standard sizes—Cutting capacities 1/32" to 2". Also specials made to order.

The KUTMORE is the only hollow mill with builtin micrometer dial adjustment. Prompt delivery —even on specials. Write for Catalog No. 15. 1625 Clinton Ave., N. Rochester, N. Y.

64

CARL WIRTH & SON,

For rapid precision marking...

#### THE PANTO ENGRAVER, ELECTRICAL MARKER AND ACID ETCHER

Pantographic bench - type machine with interchangeable heads for three classes of work. Accurate, easy to operate, built for long reliable service.

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H. P. PREIS ENGRAVING MACHINE CO. 157A SUMMIT ST. NEWARK, NEW JERSEY

## SPEED UP YOUR ... RIVETING OPERATIONS

A great help in War Production, these Grant Riveters are available in Noiseless Spinning and Vibrating Hammer types, also Vertical and Horizontal Multiple Spindle Spinning Machines. Information? Write!





MANUFACTURING & MACHINE CO.

C. E. Station, Bridgeport, Conn.

ORIGINATORS AND PIONEERS IN THE MANUFACTURE OF

#### DIAMOND TOOLS

UNMOUNTED DIAMONDS — MOUNTED DIAMONDS
FOR LANDIS — NORTON AND OTHER MAKES OF GRINDING MACHINES
SHAPED DIAMONDS FOR BORING CONNECTING ROD BEARINGS AND OTHER
MATERIALS ON WHICH A STEEL TOOL WILL NOT MAINTAIN ITS CUTTING EDGE
FOR ANY LENGTH OF TIME.

WRITE US REGARDING YOUR DIAMOND TOOL PROBLEMS.
ESTABLISHED 1796

CHAS. F. HAAKE, Successor to

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initial cost . Lowest operating cost.

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QUICK DELIVERY . . . WRITE FOR BULLETIN

DIVISION OF DIEBEL DIE & MFG. CO.

3650 N. LINCOLN AVE

Where several different movements must be synchronized and cam-actuated in the same machine, it is best to have all cams on one shaft. For that one shaft can have no lost motion as between the cams mounted upon it. Neither is it possible for cams on the same shaft to get out of time with one another in any manner.

Grinding camshafts is probably as difficult as any type of precision grinding to be found. A high degree of accuracy is required, and the contour is irregular. Accuracy must positively be maintained, shaft after shaft, day after day and week after week. Special grinders have been developed for camshaft production. Some are hydraulic machines of semi - automatic type.

Some years ago, a highly interesting grinding camshaft attachment, which could be used to advantage on cylindrical grinding machines of standard type, was developed. Basically, this device comprises a pair of work-holding centers mounted on a rocking table. Table swings the work toward and away from the grinding wheel, in such manner as to generate the quired cam contour against the wheel. Swinging action of the table is governed by a master cam of multiple type, mounted on the work spindle.

The cams making up the master are mounted in correct radial position to produce the various cams on the shaft in correct relationship. One after another of the cams in the multiple master cam is engaged by a follower roll which governs the rocking or swinging.

A sliding camshaft. It seems ridiculous, but it isn't. The application calls for operation of one cam at a time. It is a gear-tooth chamfering machine, and different pitches of gears are handled by sliding a camshaft to bring the desired cam into action.

# NEW BINS



#### for assembling small parts

Floors slope to feed parts to front — end reaching and fumbling.

All-welded construction. Rolled, smooth edges. Bins taper toward front to form convenient semi-circle —keep all bins within easy reach. Nesting, locking construction for rigid set-ups, easily changed when necessary.

Two sizes—tapered or straight edges. Hoppers available for steady work.

Write Stackbin Corporation, 55 Troy St., Providence, R. I., for further details and low prices.

## STACKBIN

"Stacked and



SYSTEM

Still Accessible"

STACKBIN CORP., Providence, R. I.

# PATENTED A2 YEARS NON - TRIPPING PRESS US

# UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send illustrated catalog describing complete line TODAY.

JOHNSON

POWER
PRESSES

42 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON PRESS USED BY LEADING MFR'S, THROUGHOUT THE WORLD.

JOHNSON MACHINE AND PRESS CORP.,

ELKHART, INDIANA







## Reversible PLUG GAGE

tells DEPENDABLY long after ordinary Gages are worn out!

#### TWICE THE SERVICE!

and more, is insured by DUBLIFE'S reversible Plugs,—both "Go" and "No Go" in same hexagonal handle. Either plug easily turned end for end when worn. Securely locked by bronze collet. Send for Catalog showing DUBLIFE and other gages of A. G. Design. Write.



## UNITED PRECISION PRODUCTS CO

3522 W. Belmont Ave.

Chicago, III.

#### **G-E Salvage Operations**

Salvaging operations effected by General Electric Company are recovering scrap metals at a rate of one million pounds per day, Harry J. Beattie, supervisor of the Company's salvage department, told the National Metal Congress as the Congress ended its fourday sessions here today.

An average of 14 carloads of salvaged metal is shipped to mills, foundries, and smelters every day in the babbitt and solders.

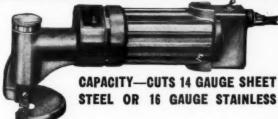
Beattie pointed out that G-E maintains within the company and separate from the salvage department, an organization which is constantly developing new ways of reducing the amount of materials necessary in manufacture. Paralleling the efforts of designing engineers, draftsmen, and methods men in this organization is the company's suggestion system which rewards war workers for suggesting production improvements.

year, Beattie told representatives of more than 300 m anu fact uring concerns gathered to study methods of doing more in war production with material now available. Beattie added that by weight approximately 90 per cent of the metals recovered is steel and iron.

Approximately 20 per cent of the salvaged materials is reused as raw materials in G-E operations, he said. Steel scrap is specially prepared for charging in e'ectric furnaces for making steel castings. Cast iron scrap is broken into suitable size for cupola charging to make cast iron castings. Copper scrap is wound into small bundles for crucible use in G-E allov foundries. Several salvage departments have furnaces for reclaiming lead,

# **GES** Electric Hand Shears

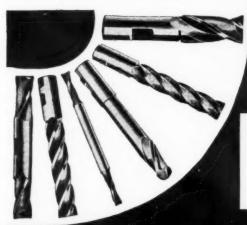
NOW AVAILABLE - FOR NATIONAL DEFENSE



This new sheet metal shear was brought out to fill the demand of the sheet metal industry for a very light weight but powerful, fast cutting tool, capable of cutting accurately to the line along straight lines as well as along small curves.

This sturdy shear will give a life time of service. The bell bearing "Grip" type Universal motor 1/2 horse power will operate on either AC or DC and 110 or 220 volts, 25 to 60 cycles. This new medel has fuse protection incorporated in switch box. Alloy Steel cutters—will cut at the rate of 6'6" per minute on 14 gauge sheet steel. Write for further information.

#### **Machinery Company** James W. George 3146 EAST JEFFERSON AVENUE. DETROIT, MICHIGAN



Shear Cut -High Speed

Shear Cut End Mills are offered in all standard sizes, single and double end.

Write for catalog and prices today.

PROGRESSIVE TOOL & CUTTER CO. 2345 WOLCOTT ST.,

FERNDALE, MICHIGAN



Years of careful engineering and "job tested" research have developed these outstanding machines, which are noted for their economy, performance and dependability. Trindl Welders are now manufactured in a range of distinctive sizes to accommodate every type of shop and production welding job. There are Trindl Welders, accessories and supplies for all requirements. Write, wire or phone for detailed specifications and prices.

TRINDL PRODUCTS, LTD. 2227-AA CALUMET AVE.

#### Hybco Tap Grinders

Seven exclusive features are claimed for this tap grinder by the maker, Henry P. Boggis & Co., 1279 W. 3d St., Cleveland, O. It is a complete, universal tap-sharpening and recondition-



ing machine, simple to operate, and relieve chamfer, grind spiral points, such as gun, chip-driver, and sharpen the face of the flutes. These are the 7 exclusive features given in literature on the equipment, offered by the firm: 1: Machine screw to 11/2" hand taps chamfer, flute, spiral point. 2: Ar-rangements for 2 to 10 flutes, right and left hand. 3: All taps held by shank. Can be sharpened after centers are destroyed. 4: Universal. Grinds any chamfer angle and any relief. 5: Standard motors to fit individual needs. 6: Precision ball-bearing grinder spindle. 7: Each revolution of hand wheel grinds chamfer on all lands.

Three sizes are available, with interchangeable chamfer-sharpening heads. Each will sharpen taps within listed capacities with 3 different numbers of flutes.

Standard equipment includes grinding wheels, wheel guards, diamond

Special Container

for narrow width

coils, 100' l.

Convenient to use.

### ATLANTIC★ Band Saw Blades

Speed Up

Metal Cutting Production

Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.

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Metal Cutting Band Saws Exclusively

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Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

#### E. A. BAUMBACH MFG. CO.

1810 So. Kilbourne Ave., CHICAGO, ILL,

## FELL PRECISION



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005\* per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes—
\$\frac{5}{2}\frac{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{2}{2}\frac{

Write TODAY for bulletin giving full details.

Wm. B. FELL COMPANY 700 South St. Rockford, III. wheel-dresser, precision, ball-bearing grinder spindle. ¼hp—115 V, 60 cycle—1 phase, 1725 rpm, sleeve bearing motor and manual switch. Optional motors as control equipment supplied to meet requirements.

Firm's catalog, supplied on request, gives full specifications and illustrated details.

#### "Know-How of Grinding"

A series of sound-color movies, "Lessons In Grinding," is available to industrial apprentice schools, Army-Navy training schools, colleges, vocational institutions, etc., from Norton Co., Worcester, Mass. In addition, it offers a "Victory Training Course" of practical instruction to foremen and supervisors, plus 17 detailed booklets, aimed to aid in speeding war production.

The film titles available are: 1. Cutter Sharpening; teaching principles of tool-room grinding. 2. The Cylindri-

cal Grinder: showing fundamentals and importance of precision. 3. The Surface Grinder: describing preparation, operation and care. 4. The Grinding Wheel, Its Care and Use: balance, truing, dressing and safety, handled pictorially, in detail.

The "Victory" Course, affording a week's training in visual and oral instruction at the Norton Plant, is available to foremen, assistants, apprentice instructors, group leaders and tool-methods engineers in war industries. It involves trips in the factory, sessions in the research laboratory, for black-board talks, mechanical demonstrations and motion pictures. All Norton facilities, which show how to increase grinding production, are open for the course, says the firm, without charge.

The informative literature is also offered without charge.

Fuller details are published by Norton in a pamphlet, "The Know-How of Grinding", to be had by executives on request.

## KEEP PRODUCTION "FLYING"

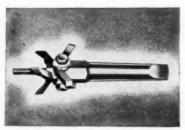


#### SIMPLEX - M ABRASIVE BAND GRINDER

This improved band grinder speeds production in war plants large and small. Built to machine tool specifications, Simplex M eliminates expensive, slow, hand emerying and filing. Assures straight grain, sharp-edged finish. Variety of sizes.

Free Booklet on Finishing! Write Today!

WALLS SALES CORP. 96 Warren St., New York, N. Y.



### THREE BLADE ADJUSTABLE HOLE CUTTER

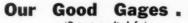
Precision adjustable hole cutters for any strength steel. Expansion range from 3/4 holes to 4/5. Capacity 3/4 thickness. Heat treated shanks. High speed tool bits, precision ground. Removable pilot...time saving... money saving, and inexperienced as well as experienced drillers can operate this tool with maximum efficiency.

WRITE FOR DESCRIPTIVE FOLDER

Robert H. Clark Co.

MANUFACTURERS . PRECISION TOOLS . PRECISION PARTS

## FORTY-EIGHT HOUR delivery of Plug Gages and our new Micro-adjustable Snap Gages



(Patent applied for)

Prevent Spoilage
Speed-Up Operations
Utilize Less Skilled Help
Reduce Costs



Quick service on Hard Chromium plating and re-sizing of worn Plug Gages

#### EASTERN PRECISION GAGE CO.

HERSH TOWER BUILDING 125 BROAD ST. ELIZABETH, NEW JERSEY, U.S.A. Phone Elizabeth 3-0523—After 5 p. m. to 9 a. m., Elizabeth 2-9519

### DIE-LESS DUPLICATING





An almost unlimited variety of work can be rapidly done by the combined use of these 3 Di-Acro anits. High hourly production rates can be easily maintained. Multiple units provide larger output if desired. All duplicated work is accurate to .0012.

> WRITE FOR CATALOG



In many cases you can make duplicated parts faster with the "Di-Acro" system, and save Man Hours and Critical Materials. In illustration from left to right: 1st—Di-Acro Shear squares and sizes material, cuts strips, makes slits or notches. 2nd—Di-Acro Brake forms angles, channels or "Vees". 3rd—Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc.

O'NEIL-IRWIN MANUFACTURING CO. 314 8th Avenue S. Minneapolis, Minn.



Cams

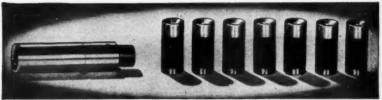
Extensive and varied are the operational objectives obtainable thru the use of cams. One might almost adopt the slogan "When in doubt, use a cam". A very interesting instance of use of a cam for automatic electrical control on an outstanding gear shaper was noted some time ago.

A switch used for stopping the machine at the proper point in the cycle is thrown out by a plunger, operated by the cam. Plunger- operating cam is perfectly timed with the feed cam, and is mounted on the same camshaft, so timing can never varv.

In the case of a highly competent vertical tool and die shaping machine, it was necessary, o n t h e return stroke of the verticallytraveling cam, to make some arrangement to prevent the tool from dragging on the work. cam was used to recede the tool on the return stroke of the ram, the action being positive. This machine has been found especially efficient for machining blanking dies.

A u t o matic speed and feed changes a r e provided on a well k n o w n

line of automatic screw machines by use of cams. This has been found to save much production time, especially in cases where long facing cuts are involved. The tool traveling toward the center is naturally cutting less metal progressively as it approaches the center unless the feed and speed is stepped up to hold the cutting speed more nearly constant. The machine carries a drum on which lever-tripping cams are mounted.



#### NEW-DIFFERENT-ADJUSTABLE-ECONOMICAL!

GREEN FEED FINGERS

#### FOR AUTOMATIC SCREW MACHINES

cover the entire range of your screw machines for a few inserts.

NO SEARCHING FOR FINGERS AND PADS

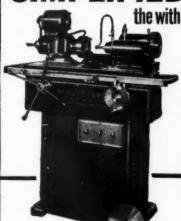
A real production speed-up with new and exclusive features. Solid, long-wear, break-proof construction. No moving parts, no springs. Adjustable by simply selecting insert nearest stock size, inserting into finger, applying tension ring and placing on machine. Soft composition contacts prevent marring of stock . . . . Order now. Satisfaction guaranteed.

Feed all shapes
Easy to load
Hold at high speed
Greater grip area
No rebound
Can't mar stock

Send for Bulletia giving details.

GREEN MFG. CO. P. O. Box 704 ROCKFORD, ILLINOIS

## SIMPLIFIED INTERNAL GRINDING the with MAJESTIC INTERNAL GRINDER



An exceptionally wide range of internal grinding jobs can be handled on the New Majestic Internal Grinder. Its simplicity of design and ease of operation are features of utmost importance in providing maximum grinding output at low cost.

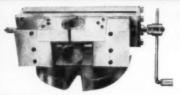
#### SPECIFICATIONS

Length of table, 48°. Swing over table, 10°. Travel of cross slide, 2½°. Precision dial graduated to .0001°. Precision bearing work head. Speeds—100, 225, 350 r.p.m.

Write for complete details contained in New Bulletin

Majestic Tool & Mfg. Co.
2948 E. Woodbridge Detroit, Mich.

#### DRILLING - TAPPING - THREADING - END MILLING



\*\* JOHN'S DRILL JIGS \*\*
FOR QUICK - ACCURATE
SET-UPS

Special plates for machine parts of almost any description can easily be made.

These jigs are now supplied with Universal Jaws which permit quick set-up for end drilling and tapping.

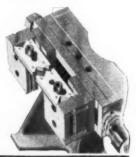
The reversible "V" plates accommodate a large range of diameters.

Write for details.

### HEUSER MANUFACTURING COMPANY

1638 N. Paulina St.

Chicago, Illinois



Women Clean 'Em Up

These machines operated by women in war plants, are being used extensively by more than 70 war industries for cleaning instruments, meters, gauges, bearings, motor assemblies, jeweled bearings, extruded elements and an infinite variety of other related small precision parts.

The model illustrated is the L & R Heavy Duty—a portable unit weighing less than 50 pounds. Instructions for use are easy to follow. Results are uniformly excellent. The principle of operation eliminates costly damage to parts. Men are released for heavier tasks. L. & R. Mfg. Co., 54 Clinton St., Newark, N. J., are the makers.

#### Chip Breaker Design

McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., has available on request Bulletin 212 entitled "Chip Breaker Designs" which was written by the Com-



pany's Tool Engineer, W. L. Kennicott. This bulletin describes the correct types of chip breakers and how to provide them for various jobs. The 4 pages contain diagrams supplementary to the descriptive materials.

MODEL SP400

#### BRADY-PENROD SELF-PRIMING CENTRIFUGAL

COOLANT PUMPS

"They Pump Air"

Through clever application of the fundamental principle of Patent No. 2,164,869, these pumps are simple in design, thoroughly dependable and instantly self-priming on normal suction lifts encountered with machine tools. Model SP400 is sturdily built, with all the superior BRADY-PENROD features, to handle abrasives and steel chips. Easily installed on present machines or quickly adapted to new machines.

Send for FREE Bulletin

#### BRADY-PENROD, INC.

1210 W. Second Street, Muncie, Indiana





L. B. 2123 Avenue U

MILLER COMPANY

Brooklyn, N. Y.



FOR U. S. FIGHTER PLANE

We are proud to announce that out of their own pockets, the employees of Universal have bought and paid for a \$50,000.00 U. S. fighter plane. And this, mind you, they have done in addition to subscribing 20% for War Bonds.

We are proud, too, of our Collet Chucks which have ground threads, ample room for tool feed-out and grip as strong as steel. Write for facts.



UNIVERSAL ENGINEERING COMPANY FRANKENMUTH, MICH.

#### Reading Bench Keyseater



With bigger machines working to allout schedules, this (portable if need be) keyseater should save time and beat bottlenecks in many plants. It's simple to operate and can handle tool steel, castiron, brass, bronze, cold-rolled steel, copper, aluminum, etc., taking the heaviest cuts, according to the maker, Reading Machine Company, Reading, (Cincinnati) O.

Illustration shows ratchet with hub on the table under clamp-arm. Note that it is a broach type cutter—¼" making for speedier work. The machine can be adapted to filing, sawing,



#### We have in stock the following high speed Taps, cut thread:



Please Send for Our Catalog.

PLUG		GUN	
SIZE	PRICE EACH	SIZE	PRICE EACH
6/32	\$ .70	6/32	\$ .80
8/32	.70	8/32	.80
10/32	.75	10/32	.85
10/24	.75	10/24	.85
12/24	.80	12/24	.90
1/4 x20	.85	1/4 ×20	.95
5/16x18 -	.95	5/16x18	1.05
3/8 x16	1.10	3/8 x16	1.25
7/16x14	1.30	1/2 x13	1.70
7/16×20	1.30	Discount of 40%	
1/2 x13	1.55		off on all these
9/16x18	1.85		taps

We also carry a large stock of H. S. Centre Drills, Jobbers, Wire Gage, letter size and Taper Shank high speed Drills, Hack Saw Blades, Emery Cloth, Tool Bit, Files sand Diamond Dressers for Emery Wheels.

SID TOOL CO.

177 Mulberry St., New York, N. Y.



Designed and constructed for handling tough production jobs.

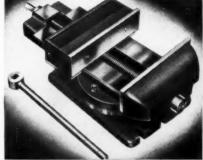
Screw extends thru both ends of vise and is fitted with a thrust bearing nut behind a stationary jaw. This unique arrangement provides greater clamping action on the work being held.

Base is accurately graduated in degrees.

#### SPECIFICATIONS

Opening of jaws	13'
Width of jaws	12%
Depth of jaws	31/4"
Overall length	241/4
3 slots in both end	of base with
	3¾' centers
Approx. weight	260 lbs.

\$150.00 PROMPT DELIVERY



ALLIED MACHINERY CO.



The NEW Rouse Hand Miller will help you speed up your small parts production, and enable you to get maximum output with inexperienced help.

The Rouse Hand Miller is a highspeed, ball bearing, motor driven machine for making light cuts in brass, aluminum and steel. It will handle efficiently small rounding and burring operations on steel and cast iron parts.

Priced low, the machine can be kept set-up for special operations with minimum machine-hour cost.

The Rouse Hand Miller is an accurate, sturdy machine, the development of many years of experience in producing fine small tools and parts. It has proved itself in the production of airplane parts, radio aquipment, meter parts, instruments, light ordnance, and similar work. Prompt delivery can be made. Write, telephone, ex

H. B. ROUSE & COMPANY

slotting, oil grooving, and is said to be capable of doing the work often done by costlier equipment.

Convenient clamp arm holds any shaped part, and chips cannot clog, falling directly into chip drawer at lower left of base.

Specifications are: floor space, 16½x 29°; height, 28" at top of stroke. (25" minimum) Stroke, 4". Motor recommended is ¾ hp, 1150 rpm.

Complete literature on the machine is available from manufacturer.

#### Thermo Electric Furnace

Announced by Thermo Electric Mfg. Co., 332 W. 69th St., Chicago, in its Bulletin G, are improvements in its Temco electric furnace. Most recent improvement, according to C. J. Ecklund, president, lies in internal construction of the muffle, said practically to end crackling, and giving increased economy and durability to this heart of the furnace.

The Temco, says Ecklund, is designed for quick and handy heat treating of small parts, gears, tools, dies, etc., and for availability as auxiliary equipment, to avoid bottlenecking on small parts, occurring where plants have but a large central unit.

The furnace operates on a-c or d-c, 115-220 volts, consumption being 1200 watts. Heating chamber is 4" wide, 33/4 high and 33/4 deep. It easily accommodates small tools and parts or 6 No. 0 tall form crucibles. Outside dimensions are 83/4" wide by 13½ high and 10 deep.

Full details are given in the Bulletin G.

WE INVITE YOU TO TRY



The World's Best Rubberised abrasives for Fine Grinding and Polishing

Attach this advertisement to your card or letterhead. We will send you a free trial sample. Or if you prefer send \$1.00 for Special 33 wheel assortment.

CRATEX MFG. CO., 81 Natoma St., San Francisco, Calif.

new! TYPE NT-20

ROGERS FACE

GRINDER

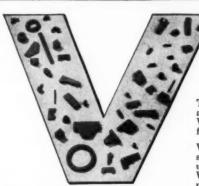
Specially designed for high production of long, narrow and light work . . . this sturdy traveling table face grinder takes work 10' to 12' high. Table length, 72"; width 16". A 10 H. P. motor mounts a 20" cylinder grinding wheel for medium duty service. Send for Circular NT-20.



SAMUEL C. ROGERS & COMPANY



ROGERS KNIFE GRINDERS QUALITY SINCE PRECISION



WRITE FOR CATALOG

Tungsten Carbide blanks as illustrated are manufactured exclusively under WILLEY'S Patents in grades suitable for all your machining requirements.

Whether you are machining tough steel, cast-iron malleables or aluminum, etc., there is a grade of WILLEY'S METAL that meets your needs for maximum efficiency. Specify WILLEY'S METAL and follow the VICTORY SIGN.

WILLEY'S CARBIDE TOOL CO

1340 W. Vernor Highway.

Detroit, Michigan



Eastern Branch - 71 West 23rd Street, New York, N.Y.

Cambering

Cambering has to do with the machining of a convexity, designed either to overcome or to neutralize deflection. It is encountered, for the most part in machine parts that are no longer than ordinary, and by reason of that length are more subject to deflection. Sometimes it is not practical to camber a given part. Then a camber beam may be attached to it to guard against deflection. This was the case with a very large planer, having a 12-foot width capacity.

The rail carrying planer heads had to be m a c h i n e d straight a n d true, so it would carry t h e heads in a straight path. The planer had 2 heads on the rail. The top of the rail was fitted with a camber beam.

Cambering also has reference to the rolls of large rolling mills. There is a certain amount of deflection in these rolls when under pressure. To predetermine deflection that will probably be present in a given roll under the conditions where it will operate, and then to incorporate enough camber into the roll so the working side of it will be a straight line when under working deflection, is the problem that comes to the roll grinder.

There are variable factors to be contended with in incorporating the right camber and thereby obtaining even - thickness

sheets, where sheet materials are being rolled. One of these is the roll diameter with reference to its length. Another is the hardness of the material from which the roll is made. Another is the amount of thickness reduction in the stock being worked at each pass thru the mill.

A special roll grinding machine has a traveling table with the wheelhead mounted on it, with provision for tilting wheelhead progressively as it travels, to grind the required amount of camber into the roll.



#### SHOP BOX (Straight side)

A Straight Side Shop Box with drop handle each end. Excellent for general use where stacking feature is not required.



#### STACKING BOX

An ideal all purpose shop box. Sturdy all welded construction. Skids act as positive stacking lock and re-inforce box at point of maximum wear.

### **STEEL BOXES**

Immediate Shipment!

No. 201— 6" x 9" x 3½"—20 ga......45c Ea. No. 202— 8" x 12" x 4"—20 ga......50c Ea.

No, 301— 6" x 9" x 3½"—20 ga.....55c Ea. No. 302— 8" x 12" x 4'—20 ga.....60c Ea.

F. O. B. Factory, Philadelphia

#### AMERICAN METAL WORKS, INC.

1502 GERMANTOWN AVE. PHILA., PA.

## DESIGNED FOR ALUMINUM AND STAINLESS STEEL

This NEW



Spot Welder

KT Model Press Type

Made in Voltages to meet Special Requirements where high Amperages and Controlled Pressure are required.

Timing Equipment for Special Jobs.

Air Operated, Oil Lubricated with Air Gauges for controlling pressure.

Water Cooled Electrodes - Refrigerating System may be added for High Production.



For additional information outlining exactly how this new welder will increase your production. Send us complete details regarding your welding problem. These Welders are individually designed to fit your needs.

300-322 Jackson St. THE TOPEKA FOUNDRY & IRON WORKS CO.,

Topeka, Kansas

#### THE JOHNSON FRICTION CLUTCH

THE NEW "MAXITORQ" MULTIPLE DISC DESIGN

...for better clutch performance under ANY CONDITIONS

More than thirty years of successful applica-tion of JOHNSON FRICTION CLUTCHES to practically all power transmission demands is behind every recommendation made by our

Engineering Department.
You can, therefore, depend on better clutch performance regardless of the severity of operating condi-tions, when you bring your clutch problems to JOHNSON Engineers for study.

Among the operating features which contribute to better performance are sensitive starting, safety, cleanliness, quietness, efficiency and

You incur no obligation in asking us to show specifically how you can improve power transmission on your machines. Just give us the details of your problem.

Write for Multiple Disc Clutch Catalog No. H-1 or consult "Thomas' Reg."



Double

"Floating Plates" in neutral



Single

CARLYLE JOHNSON MACHINE CO. MANCHESTER CO

#### Cables

Operation of various types of equipment with wire rope involves careful designing and manufacture both of rope and sheaves on which it is to run. Hardness of a sheave is of great importance. Some have thought that if a sheave were relatively soft, it would That is the be easier on the rope. exact reverse of the truth.

When a sheave is soft, the wire stranding of the rope makes indentations in the sheave groove under load.

Cutting action will be set up which will allow the rope to seat lower in a groove of its own making, and there will be abrasive action on the sides of the rope from running in this narrow groove.

Also, diameter of sheaves for wire rope is of decided importance. The larger the diameter of a wire rope sheave can be made, within consistent limits. the easier it will be on the rope. Bending the rope is what fatigues it, and the shorter the radius of the bend, the greater the fatigue.

It is the ideal of wire rope manufacturers to produce rope that will not flatten appreciably as it travels around the sheave. But it always flattens to some extent. Wherever the

pull of a straight wire rope-line may be modified thru engineering principles to operate a mechanism to advantage, wire rope may readily be applied.

This is true not only in cases where a cable drum is rigidly mounted for operation in a given location. It applies as well in a high degree to mobile equipment. It is being used especially in connection with track-type tractors. now so vital to the nation's all-out war effort at home and in the field.



#### DEARBORN Automatic Chucking and Indexing Fixture MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN
72 S. CLIFF ST. ANSONIA, CONN.





ON THE NEW ATLAS DIE-FILING MACHINES



Can be used for all kinds of die making. The overaments may be interchanged with little effort. The holddown fingers are attached directly to the overam. Working surface of the table, which tilts two directions, is entirely clear. An improved type chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

Price, complete with moter— \$125.00 Net

with motor \$125.00 Net

ATLAS EQUIPMENT CO.



Briquetting

Any type of briquetting calls for high The briquetting of metal chips is no exception. But hydraulic briquetting machines for metal chips may be obtained. There are 2 reasons for briquetting metal chips.

One is ease with which they may be handled at every point after briquetting, until they finally reach the cupola for re-melting. Another is that if metal chips are fed into the cupola in natural form, without having first been

compressed, there will be heavy metal loss thru vaporiza-

Certain things have been found wise to observe and check with reference to briquetting metal chips. One of these is whether chips are being handled in sufficient volume, and sufficient contain oil, to pay for installing oil extraction and reclaiming apparatus. In some large plants, oil reclaimed from metal chips means worthwhile saving.

Another thing to think about, where chips are being collected from machines which work intermittently steel, brass, etc., thereby mixing chips of different materials together. is whether it will pay to separate the different materials. This can be readily done where a ferrous material is mixed in with one that is non-ferrous. as steel and brass, simply by using a

magnetic separator,

obtainable from different firms. Aside from the separation angle, there is sometimes a necessary mixing angle, in the case of chips from machining tough steels. These chips are very hard and in some cases impossible to briquette alone. In such cases, it becomes necessary to mix the harder and tougher chips with softer ones. to obtain a satisfactory briquette. In general, chips must first be crushed into relatively small pieces before they can be satisfactorily briquetted.

#### Finishing Methods Bulletin

Newly developed equipment incorporating the use of surface coated abrasive belts for producing faster and better finishes is described in a booklet

recently released.

The method uses a backstand idler unit, utilizing a newly perfected segment face contact wheel and surface coated abrasive belts. Present lathe or setup equipment can be used for a complete backstand idler unit acquired for this work.



There are 3 types of segment face contact wheels that increase range of work with surface coated abrasive belts by providing a hard, flat surface for driving the belt, but with a soft center so that irregularly shaped pieces can be finished.

The segment face wheel using surface coated abrasive belts is also incorporated into a swing grinder for sanding billets, bars and tubes. Pedestal mounted or suspended from overhead rail, it is effective for repair grinding, beveling and surface grinding and is described and illustrated in this booklet.

If your finishing room is "bottled" up with work and increased production is demanded, it will pay you to write for this booklet. Just address Minnesota Mining & Mfg. Co., Saint Paul, Minn., Dept. NR1242.

Buy U. S. War Savings Bonds and Stamps

#### TYPE "R"

## MULTI PURPOSE

POLISHING and SURFACING MACHINE





This Type "R" Machine is a combination of several types of grinding and polishing machines, principally the Disc Grind-

3 OPERATORS MAY WORK SIMULTANEOUSLY ON THIS MACHINE

er, the Polishing Wheel and Belt Surfacing Machine. The machine is set up and supplied to do the work of these three machines.

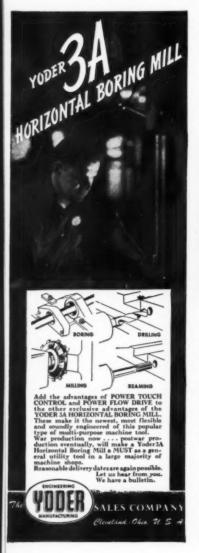
This utility machine is adapted for a wide range of uses and will find a place in many shops where space and power are important factors of consideration.

The arrangement of the machine is such that three operators may work simultaneously without interfering with one another.

WRITE FOR FOLDER GIVING FULL DETAILS,

#### PRODUCTION MACHINE CO.

GREENFIELD, MASS.



"Rapiduction" Turret Lathe

Previously furnished with manually controlled, 6-station turret, the Oster No. 601 is now equipped with automatic indexing.

The machine, having a capacity of 1 in round for cutting-off, boring, tapping, reaming, facing, threading, and for many other operations, is simplified in design and construction to meet requirements for low cost and easy operation.



The machine can be specified with a worm or direct drive to spindle, a 2-speed motor, reverse and electric brake control. The motor drives thru multiple V-belts, with speed changes being obtained by application of quick-change sheaves for 140 to 1,000 rpm on the worm-drive design with 1800-3600 rpm motor; and 70 to 500 rpm with 900-1800 rpm motor; and with 900 to 3000 rpm on the direct drive design with 1800-360 rpm motor and 45 to 1500 rpm with 900-1800 rpm motor.

The spindle is mounted on ball bearings. A belt-connected coolant pump is assembled in machine base. The machine occupies 33 by 70 in of floor space, not counting its bar-feed extension, which requires 94 in beyond the pan. Net weight of machine is approximately 1700 pounds. It is made by The Oster Mfg. Co., Cleveland, Ohio.

#### Helping to Beat the Axis

Typical of production achievements honored at the White House is that of Walter P. Hill, Detroit, development engineer for Wolverine Tube Division of Calumet & Hecla Consolidated Copper Co., who devised a notable improvement in methods of fabricating a small primer tube, used in the firing mechanism of all the millions of large shells produced in this country.



Hill augmented his work at the plant with long hours spent in a fullyequipped machine shop in the base-ment of his home, and developed a process that effects remarkable savings in critical materials as well as in man-hours and machine time. One operation now does work that previously took 6 separate production oper-Since devising this improvement, Hill has been busy, with cooperation of his employer, in working with Ordnance offices from coast to coast, assisting other plants to make full use of the new method, and multiplying the importance of the production increase accomplished, on a national scale.

Hill is the only Michigan man among the six Citation Award winners to be honored by the President.

"KEEP 'EM FLYING"



## STANDARD REAMERS available from stock

REAMERS and many other cutting tools, formerly in the "special" class are now STANDARD with us. The majority of these STANDARD cutters is in stock most of the time. Our broad line often enables the consolidation of tool orders and saving of valuable time. Each W-S tool is genuine CARBOLOY tipped. The grade used is the one best suited to do a cutting job on the metals for which the tool was ordered. (Other brands of carbide can be specified.) Carbide tipped tools are not just a specialty with us ... we make them exclusively. You can expect and get uniform, high quality results with W-S tools. Write for new free Catalog 942 and latest prices. WENDT-SONIS COMPANY, HANNIBAL, MO.

SAVE TIME... wire or phone your requirements!

W-S Carbide Tipped
Core Drills available
in straight and
lapered shanks,
Sives: ½ to 1½.

W-S Carbide
Tipped Centers
available in More
Frowner's Sharpe
and Jarno
Tapers,

CARBOLOY CUTTING TOOLS
CENTERS - DRILLS - CORE DRILLS - COUNTER



This mid-Western ordnance steel concern, producing armor plate, put Capewell's TECHNITE hack saw blades to a thorough test. They acknowledged their approval with repeat business. Again Capewell cut costs. Capewell blades last longer, cut faster. Order from your mill supply man today.

THE TREND IS TO TECHNITE

#### New Booklet on A-C Welders

A new 8-page booklet, B-3090, describing a-c welders is available.

The Westinghouse a-c welder is designed especially for use with Unionmelt welding. These transformer welders together with Unionmelt equipment are offered for fast continuous production at low cost.

The new booklet describes the advantages of the a-c welder and its performance with the Unionmelt process. Several applications are listed and described, and photographs illustrate the various parts of the unit and some applications.

This process has proved particularly advantageous for speeding production in such vital defense industries as ship building, freight and tank car construction, etc.

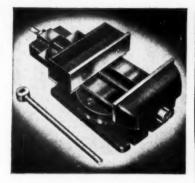
A copy of the booklet:—"Westinghouse A-C Welders for Use With the Unionmelt Process" is available from department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

## The Globe Miller AND METAL CUTTING ACCESSORIES



Quickly converts your lathe into an efficient milling machine. With its accessories, it performs practically any milling operation accomplished by heavier, coetifier milling machines—plain and angular milling, slotting, slitting, keyway cutting, locasses swing of your lathe 5' or more permitting larger turning operations. Pertable, requires little space. Write for detailed loider.

GLOBE PRODUCTS MFG. CO. 3380 Robertson Blvd. Los Angeles, Calif



#### Allied Heavy Duty Vise

With the screw extending thru both ends, and fitted with a thrust bearing behind the stationary jaw, greater clamping action and relief of strains is claimed for this heavy duty vise, announced in literature offered by Allied Machinery Co., 14 N. Clinton St., Chicago. The unique arrangement provides for pulling as well as pushing of the sliding jaw. Screw nut is designed to make it easy to remove, permitting sliding jaw to clamp slightly tapered pieces without damage to vise. Swiveling to any determined angles is made possible with the graduated base. Maximum stability under heavy pressure is claimed, due to rugged design and embodiment of selected materials in construction. Made of heavy closegrained castiron with screw of finely polished steel. Specifications: Opening of jaw (inches); 13; width of jaws, 12%; depth of jaws, 3¼; overall length, 241/4; 3 slots in both ends of base, with 33/4 centers, Approximate weight, 260 lbs.

#### **Vigilantes**

Plant-protection at Westinghouse Electric & Mfg. Co., Pittsburgh, includes vigilance against not only air raids, but against acts of sabotage, says the firm. Some 8,500 employe, air raid vigilantes are ready to protect workers and equipment against fire, air raid or saboteurs.

### New Models! New Designs! New Efficiency!

## ERICKSON PRECISION COLLET CHUCKS



This Chuck, f a m o u s throughout industry, now available in a c o m p l e te range of sizes and shanks. Adaptable for use on all type of production equipment.

Send for particulars.



ERICKSON STEEL CO.

2309 HAMILTON AVE.

CLEVELAND, OHIO



#### Standard Offers New Buffing-Grinding Unit

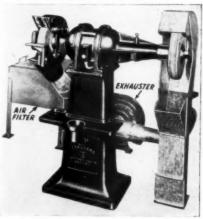
Here is a new design of Combination Grinding and Buffing Machine, featuring in the assembly, an exhauster equipment for removing and collecting grinding and buffing particles which might otherwise disturb the operator and damage surrounding equipment if not arrested.

floor clearance.

A 2 hp machine is shown. Other sizes available are 1, 3 and 5 hp.

On the left side is a safety hinge door emery wheel guard, adjustable to wheel wear and fitted with adjustable spark breaker and work rest. The spindle is mounted in 3 heavy duty ball bearings and the buffer end is fully enclosed. Tool tray and removable water pot are fitted to front of pedestal.

The dust arrester assembly includes material handling fan, blower, air filtering stand and adjustable exhaust hood for buffing wheel. The machine motor and fan motor operate simultaneously thru the push button starting equipment.



Detailed information is available from Standard Electrical Tool Co., Dept. N, 2488 River Road, Cincinnati, Ohio. MODERN COUNTERS. that do the JOB

Positive, effortless action that is entirely new in Mechanical Counters has been achieved in Silver Kings thry long research and specialized design effort.



Write for Complete Catalog

One-piece Bakelite number wheels are 80% lighter. Unbreakable plastic windows streamlined to avoid shadows. All steel housings. Counter assembly has only one screw. Many other

features assure dependability and long wear life beyond calculation.

SILVER KING

Before you buy counters, see a Silver King. Quick delivery.

roduction Instrument Con 704-14 W. JACKSON BLVD. CHICAGO, ILL.

Manufacturers of Counting, Timing and Recording Devices



### STRAIGHT SHANK TWIST DRILLS HIGH SPEED

**Jobbers or Short Length** 

#### **Immediate Delivery**

Send us your inquiries if in need of Emery Cloth, Grinding Wheels, Reamers, Taps & Dies, Tool Bits, Drills, Belting, Files, Cutters, Chucks, Mandrels, etc.

SIZES	PRICE PER DOZEN HIGH SPEED STEEL	LENGTH OVER ALL INCHES
1/16 5/64	\$ 1.80 1.86	21/2 25/4
3/32	1.92	23/4
7/64	2.04	274
1/8	2.16	3
9/64	2.34	31/4
5/32	2.52	31/4
11/64	2.70	3%
3/16 13/64	2.91 3.15	31/2 35/4
7/32	3.45	33/4
15/64	3.75	3%
1/4	4.05	4
17/64	4.50	41/6
9/32	4.95	41/4
19/64	5.40	4 %
5/16 21/64	5.85 6.45	41/2
11/32	7.05	43/4
23/64	7.65	4%
3/8	8.25	5
25/64	9.00	51/4
13/32	9.75	51/4
27/64 7/16	10.50 11.25	5% 5½
29/64	12.00	5%
15/32	12.75	53/4
31/64	13.65	5 %
1/2	14 55	6.0

## 4 of the many ways . . . SLOTMASTER can be used to save TOOLS & SET-UPS

Left: Set-up for cutting a spline in an adapter

Below: Set-up for cutting an internal genr SLOTMASTER can be used on say round or flat-on round over-arm milling machine and will do precision work that normally requires a multi-thousand dollar machine (all of the working parts are of tool steel, heat treated). It takes but little time to change over from one head to the other . the stroke of the ram is adjustable from 0 to 4°. the speeds range from 50 to 250 s.p.m. The tool holder is of the clapper box type and can be turned in any position . SLOTMASTER comes complete with pulleys, motor, mounting tracket, etc. Send for 4-page catalog—que specifications of the milling machines you wish to equip.



### Experimental Tool & Die Co. 12607 Greiner Detroit, Michigan

Relew: Conventional net-up on a round overarm million machine—thembasi shows a net-up for shaping a feed cam.



There are many places where a rotary wire brush comes in very handy. There are different ways of using them to advantage. Sometimes, rotary wire brushes are applied to grinding wheel stands, tho such brushes are available from wire brush specialists to fit any buffing, cleaning or polishing machine. They are, in fact, made to fit thru the use of patented adapters made by the same firm, which also has a new process for locking the wire in place

in the wheels. Wire brushes may be had in diameters all the way from 4 to 12". It is wise, in some cases, to have a number of brush diameters at hand. to handle different kinds of work. Obviously, a large-diameter brush will not get into smallradius internal curves like a brush of small radius. Just as surely, the small-radius brush will not have the capacity of a larger one on many types of work.

Manufacturers of flexible shaft units are usually in a position to furnish wire brushes of different kinds for use with their machines. Since rightangle heads are available for use at the end of a flexible shaft, such as are used for operating a sanding disk, one can use wire brushes of the rotary scrubbing type with the flexible shaft machine. or he can use the standard type wire brush. This type of

equipment is convenient for getting at bulky work, where it is difficult to manipulate the work itself.

One of the leading manufacturers of spray guns, and paint spraying equipment in general, has developed an air driven wire brush cleaning unit, for rapidly cleaning metal surfaces, to remove rust, scale, dirt or old paint, and to put the work into condition for priming or paint coatings. This unit weighs only ten pounds, and requires from 8 to 10 cu. ft. of air per minute.

#### Cleaner, Stronger Welds

A new patented compound, Protect-O-Metal No. 2, for spatter-proof electric welding is announced. It is claimed that the compound not only eliminates weld spatter but also increases the weld's tensile strength and saves welding rod.





The compound in liquid form is brushed directly into the seam to be welded and on surrounding surfaces where spatter usually collects. As the makers explain, the welder then proceeds to weld (it is not necessary to wait for compound to dry). After welding, simply wipe surfaces with a damp cloth. Spatter and surface oxide are removed, leaving a clean job. The compound is said to act as a cleanser of the metallic surfaces, thereby providing a suitable surface for a paint finish. The compound also is claimed to prevent pitting of metallic surfaces.

An important advantage emphasized for the new compound is that it causes no smoke or odor. By thinning with water, user obtains between 2 and 3 gallons from every gallon purchased.

A free sample for test purposes will be supplied. Requests must be made on company letterheads and addressed to G. W. Smith & Sons, Dept. M-7, 79 S. Sperling Ave., Dayton, Ohio.



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In making your request . . . on your own letterhead . . . ask for Catalog No. 3. It will be sent by mail Prepaid without cost or obligation.

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Office and Factory:
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## WET TYPE ABRASIVE CUT-OFF MACHINE





Abrasive wheel cutting is the modern way to speed up operation and lower cutting cost. This machine cuts tubing to 3", solids to 2" accurately, smoothly. Especially recommended for cutting high alloyed hard steels and many other materials. Designed and engineered for high production, ease of operation, safety, and long life. Prompt delivery.

For detailed information, write for Bulletin No. 6.

## The CATSKILL

#### **Braille Micro-Chek**

Thousands of blind men and women now can be recruited for war production as a result of development of a Braille type comparator inspection gage.

The instrument, known as the Micro-Chek, has endorsement of the National Society for the Blind.

"You are to be congratulated upon the development of so simple and practicable a device, both for sighted and blind," says a telegram received by John R. Oishei, President of Trico, from Lawrence Q. Lewis, executive director of the society. "The National Society is greatly interested and heartily approves your

Braille Micro-Chek as an aid to employment of capable blind persons in industry."

The Braille instrument is the outgrowth of the newly perfected Micro-Chek, which in a few short months



is said to have been put into use by more than 1400 war plants and government arsenals in the U. S. and Canada. The device visually checks dimensions with split-thousandth accuracy.

## MODEL "D-2" ABRASIVE CUT-OFF MACHINE

The new model "D2" Catskill Abrasive Cut-Off Machine embodies all the

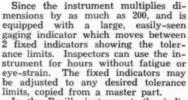
features essential to fast, accurate abrasive cutting, as well as many new features.

Designed as a dry unit, the pedestal base is so arranged as to permit the use of a coolant system for wet cutting. Available with slower speed motor for high speed steel saw cutting of non-ferrous metal. Swivel vise of V block type allows cuts from right to 45 degree angles, and can be rapidly locked in place. Equipped with stop gauge. Work is held by adjustable jaw vise, foot operated.

Complete descriptive circular with specifications will be sent on request. ASK for bulletin No. 7.



**NEW YORK** 



In the Braille instrument, the indicators protrude thru a slot, so that a finger touch reveals the movement and enables a blind inspector to determine instantly whether the part will or will not meet the tolerance requirements.

The Micro-Chek is furnished with various types of anvils for thread-gaging, thread-lead gaging, for internal dimensions, etc.

A booklet showing many applications of the Micro-Chek has been published. Copies may be obtained by addressing Trico Products Corp., 27 Goodfellow St., Buffalo, N. Y.

**Tool Conservation Posters** 

To help combat the appalling in-

crease in tool breakage which has accompanied introduction of vast numbers of untrained and unskilled workers into the nation's war plants, Genesee Tool Co., Fenton, Mich., has developed a series of educational posters designed to impress workers with the importance of proper tool handling and care. The posters depict in a dramatic way the effect of tool breakage on the war effort.

In 3 colors, and measuring 2-1/3 by 3½ ft., they will be supplied without charge, primarily to users of the company's Tomahawk brand tools for mounting alongside of tool crib windows. A new poster will be furnished bi-monthly in order that a fresh appeal to workers may be maintained continuously.

Basic theme of the posters is the phrase—There Is Just So Much Tool Steel Available. In appeal however, there is a wide differentiation between different posters, since investigation has revealed that no single type of appeal is equally effective with all workers.

#### **Practical Training Helps**

Recognizing urgent need for speeding the training of new workers in the war production industries, South Bend Lathe Works, South Bend, Ind., has prepared helpful material for training lathe operators.

Available are motion picture films, instruction books, bulletins, wall charts and blue prints on lathe operation as described in a recently published four-

#### ALPHIL SPOT WELDERS

MORE PRODUCTION —LOWER COST Used in leading Aircraft Industries and many other Government plants.

Welders built for both foot and air operation.
Rocket Arm, Press Type, Lower Ajustable Arm, Straight Up and Down, also Swivel Type.
PROBLEMS? — CONSULT US. For literature and prices write to Dept. BJ

Alphil Spot Welding Co. 431 W. Broadway, New York, N. Y.





page, four-color circular, No. 21-C. This circular offers sample copies of several publications without cost to those in charge of apprentice training and instruction in shop work.

### MULTIPLE THREAD-MILLING HOBS

... In any Thread System, Any Thread Angle, or Thread Form. Either Inch or Metric. Left or Right Hand Threads FREE OF DISTORTION.

In dimensions up to 7° O. D. and up to 4° Thread Length for INTERNAL or EXTERNAL THREADING.

Tolerances: Cut on machines adjustable for tolerances up to 1/10,000.

All hobs demagnetized, relieving chips immediately.

For quick action call plant at Clinton, Indiana, Telephone 85

Delivery time: From one week on.



U. S. MACHINE TOOL MFG. CORP.,

100 South Sixth St. Terre Haute, Indiana



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#### PREVENTS SPOILED WORK

PREVENTS
LATHE AND
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INSTALLS IN FEW MINUTES

#### AMERICAN AUTOMATIC LATHE STOP GAUGE

Accurately, automatically stops carriage at any set points in production of duplicate pieces. Sets from one to eight stops or more. Operator can start the cut and walk away from the lathe. Makes it impossible to spoil work. Impossible for carriage to run into chuck or headstock. Invaluable in training shops and schools. WRITE TODAY FOR DETAILS. Dept. B.

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## S-P-E-E-D PRODUCTION-



## STAKING MACHINE

SPEED WAR PRODUCTION—Ideal for staking and riveting when absolute accuracy and uniformity is essential. Blow of trip hammer is always uniform and can be adjusted to hit proper blow for job at hand.

The most efficient device available for pointing with platinum, tungsten or silver. Excellent for numbering.

Supplied in three sizes, Model No. 1, Model No. 1-B and Model No. 2. Write for illustrated folder.

WEBER MACHINE CORPORATION 61 RUTTER ST., ROCHESTER, NEW YORK



#### Get Facts Now on DRILL JIG BUSHINGS and other Precision Items

\* A simple stroke of the pen... your signature affixed to a set of specifications will bring quick information on Acme's two complete bushing standards... the A.S.A. (American Standards Ass'n.), and the Acme Standard Because of this larger line of bushings, special requirements are often found to be standard at Acme.

In addition to the manufacture of drill jig bushings, Acme also offers many other precision items, such as Dowel Pins, Liner Pins and Bushings, Screw Machine Reamers, Limit Gages and Lightwave Measuring Equipment. Other Acme services include Precision Grinding, Flat and Cylindrical Lapping and the manufacture of hardened and ground parts to order.

Write - Your inquiry will receive prompt attention.



#### ACME INDUSTRIAL COMPANY

Makers of Standardized Jig and Fixture Bushings

210 N. Laflin St. Chicago, Ill.

MONroe 4122



For precision metal cutting tools made to your prints A. C. E. offers you a highly specialized experience that assures exact reproduction of your design and a rigid inspection which reduces rejects to a minimum. NOTE: We make no cutting tools for stock.

No have a special department for grinding reamers from the solid. In efficiency and life, reamers ground from the solid are far superior to the conventional type of milled reamers. A fair comparison would be that of a cut thread tap to a ground thread tap.

Write for new illustrated bulletin

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AND ENGINEERING CORP., CARREN, MERR

SPECIALIZING IN HIGH SPEED POTENTIAL TO SOUR PRINTS

#### Here's Where To Buy What You Need

This is the most complete Directory of Machine Tools, Materials and Supplies ever published in The Machine Tool Blue Book. Keep it handy for reference in selecting your 1943 equipment and determining sources of supply.

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N. Y. C.
Colorurium Co., 500 W. Huron St., Chicago
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Scully-Jones & Co., 1907 S. Hockwell, Unica BALANCING EQUIPMENT Anderson Bros. Mfg. Co., Rockford, Ill. Gisholf Machine Co., Madison, Wis. Ideal Commutator Dresser Co., Sycamore, Ill. Norton Co., Worcester, Mass. Sundatrand Machine Tool Co., Rockford, Ill. BALING PRESSES

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be Blades, band saw Blades, band saw BAND SAW GUIDES See Saw Guides, Band

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Van Norman Machine Tool Co., Springfield, Mass.
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Ahlberg Bearing Co., 3025 W. 47th 8t., Chicage
Bartam Ball Bearing Co., South Bend, Ind.
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Marlin-Rockwell Corp., Jamestown, N. Y.
New Departure Div., Bristol, Com.
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Smith Bearings Co., L. C., 2708-09 Michigan
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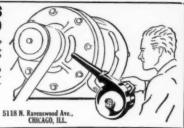
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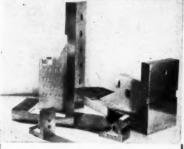


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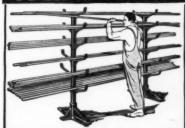
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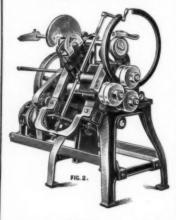
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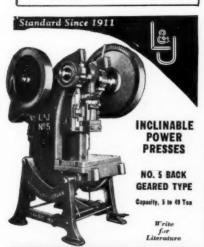
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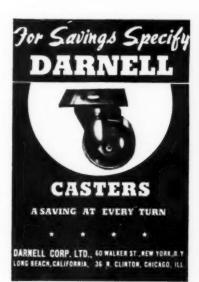
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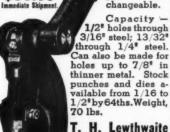
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#### **Ground with Radial Relief**

Included angle 60 degrees. Other angles made special to order.

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Size A-1	Dia. Body 1/8"	Dig. Drill 3/64"	Length Overall 11/4"	H. S. Steel Net \$2.50	H. S. Steel Net \$7.20
C-2	13/64~	1/16"	17/8"	3.00	7.20
D-1	15/64"	5/64"	2"	3.25	7.20
E-1	3/10"	3/32"	21/8"	3.50	7.20
E-2	3/10"	1/8"	21/8"	3.50	7.20
F-1	7/16"	5/32"	23/4"	4.50	10.80
F-2	7/16"	3/16"	234"	4.50	10.80
J-1	1/2"	7/32"	3"	020000	16.20
J-2	1/2"	9/32"	3"	001000	16.20
M-1	5/8"	7/32"	31/4"	******	21.60
M-2	5/8"	9/32"	31/4"	010010	21.60
N-1	3/4"	1/4"	31/2"	400000	28.80
N-2	3/4"	5/16"	31/2"	******	28.80

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3	1/32	1	1.98
3	3/64	1	1.98
3	1/16	1	2.04
3	3/32	î.	2.04
3	1/8	1	2.10
3	5/32	1	2.20
4	1/32	1	2.58
4	3/64	1	2.64
4	1/16	1	2.70
4	3/32	ī	2.82
4	1/8	1	3.00
4	5/32	1	3.12
4	3/16	1	3.30
5	1/16	1	3.48
5	3/32	1	3.78
5	1/8	1-11/4	3.96
5	5/32	1-11/4	4.20
5	3/16	1-114	4.44
6	1/16	1	4.38
6	3/32	1	5.02
6	1/8	1-11/4	5.16
6	3/16	1-11/4	6.24
8	1/16	1	10.00
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8	3/16	1-11/4	11.88
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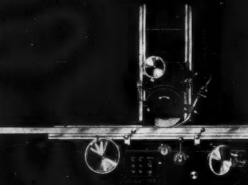
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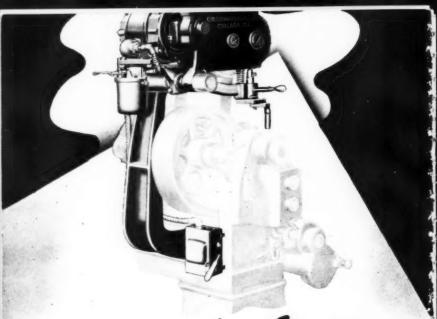
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